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Elko, Nevada Railroad Relocation Demonstration Project

Environmental Impact Statement

Conceptual Plans

Section 4(f) Statement

Benefit · Cost

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Elko, Nevada, Railroad Relocation Demonstration Project

Report Number: FHWA · NV · EIS · 74 · 01D
City of Elko, Elko County, Nevada

Draft Environmental Impact Statement

U.S. Department of Transportation
Federal Highway Administration, State of Nevada and City of Elko, Nevada

Administrative Action for

Relocation and construction of 1) that portion of the Southern Pacific Transportation Company and Western Pacific Railroad Company mainline track with grade separation structures from a point approximately 1/2 mile west of the intersection of the west city limits of Elko and the Western Pacific mainline tracks and proceeding in an easterly direction along the present Western Pacific mainline to approximately the easterly city limits of Elko; and 2) the relocation and construction of the present Western Pacific yard facilities from the present location to an area approximately 4 miles east of the easterly city limits of Elko along the present Western Pacific main line track.

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THIS RAILROAD-HIGHWAY-CITY IMPROVEMENT IS A RAILROAD-HIGHWAY CROSSING DEMONSTRATION PROJECT PROVIDED FOR BY SECTION 163 OF THE FEDERAL HIGHWAY ACT OF 1973. THIS STATEMENT FOR THE IMPROVEMENT WAS DEVELOPED IN CONSULTATION WITH THE NEVADA HIGHWAY DEPARTMENT, AND THE FEDERAL HIGHWAY ADMINISTRATION AND IS SUBMITTED PURSUANT TO:

42 U.S.C. 4332(2)(c), 23 U.S.C. 128(a),
49 U.S.C. 1653(f) AND 16 U.S.C. 470 (f)

2/10/75 — William L. Nagel
DATE
William L. Nagel
Ass't Deputy Highway Engineer
Nevada State Highway Department

2/10/75 — L L Stenovich
DATE
L. L. "Dutch" Stenovich
Mayor
City of Elko, Nevada

2/10/75 — E. L. Hirsch
DATE
for Division Engineer
Federal Highway Administration

Chilton Engineering
Elko

De Leuw, Cather & Company
San Francisco

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Summary

Elko, Nevada, Railroad Relocation Demonstration Project

1) Federal Highway Administration
Administrative Action Environmental Statement
(X) Draft ( ) Final
(X) Section 4 (f) Statement Attached

2) For additional information about the proposal and statement, contact:

Ira S. Rackley, P.E.
Project Manager
421 Court Street
Elko, Nevada 89801
Phone (702) 738-3108

3) Description

The project consists of relocation and consolidation of approximately 5.4 miles of main line Southern Pacific and Western Pacific track from the downtown area of Elko, Nevada. The project is located within the urban limits of the City of Elko, Elko County, Nevada, except for the proposed new Western Pacific yard location, which is approximately four miles east of Elko in the vicinity of the present main line tracks. The project is a demonstration railway-road grade crossing elimination project designated in Section 163 of the 1973 Federal Highway Act.

4) Summary of Environmental Impacts

The new alignment requires approximately 46 acres of land consisting of 25 acres within the urban area and 21 acres of open land void of development.

The right-of-way would displace 65 to 115 living units and 13 to 24 commercial units depending on the alternative alignment selected. Railroad noise will be increased in the new corridor and substantially decreased in the Central Business District. Vehicle emissions will be reduced within the urban area due to the project. Land use and development will benefited by the project as will the entire community of Elko.

Vehicles, pedestrians and railroads will benefit from reduced operating costs, time savings, convenience and reduction in accident rates. The Central Business District will benefit from the removal of the tracks, thereby encouraging development.

5) Alternative Proposals

The alternatives available are the "do nothing," consolidation along a single corridor through the downtown area, relocation and consideration along the north or south bank of the Humboldt River, and relocation and consolidation to the north or to the south of the City of Elko.

6) Organization and Agencies Being Contacted for Comments

The following list includes the Agencies and Organizations which have been contacted. Many local businessmen in Elko have also contributed information to this report.

- Federal Agencies:

  Council on Environmental Quality
  Environmental Protection Agency
  Department of the Interior
  Department of Commerce
  Department of Army

Department of Agriculture
Department of Transportation
Department of Health, Education, and Welfare
Department of Housing and Urban Development
Advisory Council on Historic Preservation

- State Agencies:

Comprehensive health Planning
State Planning Board
Conservation and Natural Resources
Fish and Game
Nevada State Highway Department
Department of Commerce
Department of Economic Development
Employment Security Department
State Clearinghouse (OMB A-95)
Public Service Commission
Nevada State Museum
Nevada Historical Society

- Other Agencies and Organizations:

Sierra Club
Nevada Archeological Survey
Northeastern Nevada Museum
Foresta Institute
Nevada State Herritage Association
Desert Research Institute
Stanford Research Institute

- Local Agencies, Organizations and Businesses:

Elko City Council
Elko County Commissioners
Elko County Sheriff
Elko Police Department
Elko Fire Department
Elko Ambulance Service
Elko County School District
Elko County Welfare
Elko County Assessor
Union Federal Savings & Loan
First Western Savings
Elko Planning Commission
Elko Daily Free Press
Elko Independent

- Utilities and Railroads:

California-Pacific Utilities Company
Southwest Gas Company
Nevada Power Company
Western Pacific Railroad Company
Southern Pacific Railroad Company

This draft EIS will be mailed to those listed above and made available to the general public via the Public Library System; Elko's City Hall; the Nevada State Highway Department's District office in Elko and the Headquarters Office in Carson City, Nevada; the consultant's office in Elko, Nevada; and at a public hearing to be held in the immediate future in Elko, Nevada.

Draft Environmental Statement Mailed 2/10 ,1975.

The preparation of this report has been financed as a demonstration project under Section 163 of the Federal-Aid Highway Act of 1973.

Part I

Introduction

SECTION 1. REPORT PURPOSE AND ORGANIZATION

2. ELKO, NEVADA AND IT'S RAILROADS

Section 1

Report Purpose and Organization

PURPOSE

Section 163 (a) of the Federal-Aid Highway Act of 1973 states, "The Secretary of Transportation shall enter into such arrangements as may be necessary to carry out demonstration projects in Lincoln, Nebraska; Wheeling, West Virginia; and Elko, Nevada, for the relocation of railroad lines from the central area of the cities in conformance with the methodology developed under proposals submitted to the Secretary by the respective cities."

This report sets forth the conceptual plan, environmental impact, and benefit-cost comparison of alternative consolidated railroad realignments through Elko, Nevada.

This report has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), 23 CFR (Code Fed. Reg.) Part 771 and 790. The purpose of this report is to present a description of the proposed project the alternative alignments considered for the project, and the anticipated effects on the natural, social and economic environment. In addition, this impact statement serves as a forum to assist the decision-making agencies and the public in arriving at a decision on the specific railroad alignment to be implemented. It includes, as required by Federal statute, a "Section 4f Statement." This discusses the impact of the project on open space and parkland. Under Section 163 (a) (2) of the Federal-Aid Highway Act of 1973, a favorable benefit-cost ratio is necessary for project approval.

ORGANIZATION

The report is organized to describe the existing problem of main line railroad operations through Elko, present alternative solutions to that problem, assess the environmental impacts of the alternatives, and compare the benefit-cost ratios. The following is a brief explanation of the reports outline.

Part I Introduction

An explanation of the report's purpose, organization, review process, and background of the project.

Part II Project Presentation and Alternatives

This part examines the existing railroad operations and requirements for design of railroad relocation. The various alternative alignments are examined and possible plans for redevelopment of the downtown and riverfront areas are set forth.

Part III. Land Use Planning

A discussion of the population trends, existing land use, and the proposed Elko General Plan.

Part IV. Impact: Natural Environment

The impacts on the natural environment of the various alternative alignments are evaluated. Topography, geology, soils, water resources, flood control, air quality, noise, vibration, vegetation, and animal life are the topics addressed.

Part V. Impact: Human Environment

The impacts on the human environment of the various alternative alignments are evaluated. History, archeology, population, land use and displacement, transportation, schools, emergency services, utilities, visual and aesthetic environment are the topics addressed.

Part VI. Summary of Impacts

The impacts of the project, Beneficial, Adverse, Irreversible Commitment of Resources, Short-Term Use Long-Term Productivity, and Mitigation are summarized in tabular form. The impact on the natural and human environments of relocating the Western Pacific classification and some four miles east of Elko are also evaluated.

Part VII. Cost-Benefit Comparison

An analysis ofthe costs and benefits of each alternative railroad alignment.

Part VIII. Coordination and Comments

Comments from interested parties and agencies

Section 4f Statement

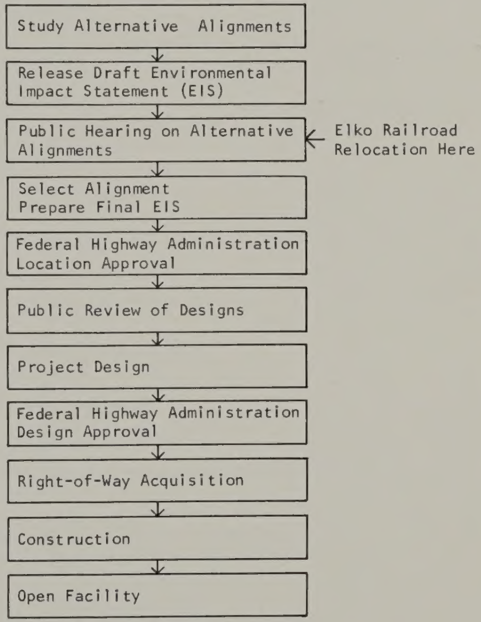
A discussion of the project's impact on open space and parklands.

REVIEW PROCEDURES FOR IMPLEMENTATION

The overall procedure and required hearings involved in implementing this railroad relocation project are outlined in Exhibit 1-1, entitled "General Implementation Procedure." The time required for each step can be dramatically altered for a number of reasons, including: time required for decisions to be made; potential litigation, and availability of funding.

The impact statement will be released prior to the public hearing on alternative alignments (30-day minimum) to allow thorough review by all interested individuals and agencies. Comments received at the hearing, plus those received in a 10-day period following the hearing, will be included in a transcript of the proceedings. After completion of the hearing transcript a decision concerning the preferred railroad alignment (two-three months after the hearing) will be made.

After a selection of a preferred railroad alignment, a final environmental impact statement will be prepared in detail, including responses to all issues and concerns raised before, during and after the public hearing. The final impact statement will be submitted to FHWA for forwarding through the Federal review process. Location approval will be requested in accordance with PPM 20-8 shortly thereafter.


Study Alternative Alignments
Release Draft Environmental Impact Statement (EIS)
Public Hearing on Alternative Alignments
Elko Railroad Relocation Here
Select Alignment Prepare Final EIS
Federal Highway Administration Location Approval
Public Review of Designs
Project Design
Federal Highway Administration Design Approval
Right-of-Way Acquisition
Construction
Open Facility

1-1. GENERAL IMPLEMENTATION PROCEDURE

Section 2

Elko, Nevada and its Railroads

PROJECT SETTING

The project is located in Elko, Nevada, which, with an estimated population of 8,500 in 1973, is the largest community between Reno, Nevada and Salt Lake City, Utah. The northeastern corner of Nevada lies at the northerly edge of the arid Great Basin, described by early travellers as the "Great American Desert." It is one of the most sparsely populated areas of the continental United States.

Elko is the commercial and retail center of a large tributary area. Elko is 290 miles from Reno and 225 miles from Salt Lake City.

Twin Falls, Idaho, approximately 200 air miles to the north and Ely, Nevada, approximately 190 miles to the south are the closest communities of comparable size. (See Exhibit 2-1)

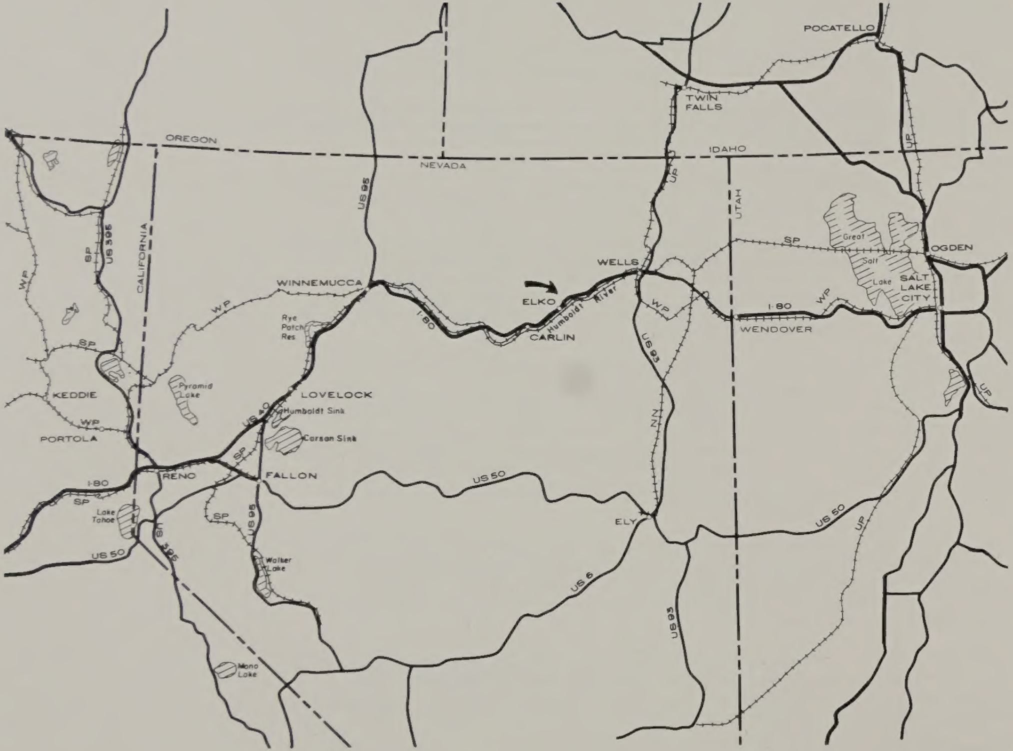
Two major transcontinental railroads, the Western Pacific and the Southern Pacific, pass through the City. The Western Pacific links with the Union Pacific and Denver Rio Grande Western lines at Salt Lake City. In California the east-west line of the Western Pacific crosses the Sierra Nevada at Beckwourth Pass, thence descends the canyon of the Feather River to the Central Valley. A connection is made with the railroad's north-south Oregon branch line at Keddie. The Western Pacific railroad mileage to Salt Lake City is 263 miles and 368 miles from Elko to Keddie. The major WP terminal is at Stockton, California.

The Southern Pacific joins the Union Pacific and Denver Rio Grande Western lines at Ogden, Utah, some 226 miles east of Elko. To the west, the Southern Pacific crosses the Sierra Nevada via Donner Pass, and descends to the important terminal of Roseville, where connections to the San Francisco-Oakland area, southern California, northern California, and Oregon are made. In addition, Southern Pacific enjoys trackage rights via the Western Pacific westerly from Winnemucca, Nevada, providing a more direct short-cut route to Oregon.

Interstate 80 (portions not constructed to Interstate design standards are sometimes referred to as U.S. 40) also passes through Elko. The transportation corridor comprised of the two railroads and the Interstate highway is the dominant transcontinental surface connection between northern California and the east.

Route U.S. 40 is being upgraded to Interstate highway status, but presently the existing interstate ends just east and west of the City. Current plans call for the eventual connection of these two segments immediately north of the existing community.

Physically the City lies in the valley of the Humboldt River, an intrastate river which decreases in volume as it flows through the arid regions of northern Nevada until it eventually disappears into the Humboldt and Carson Sinks near Lovelock. The Humboldt valley through Elko is oriented



2·1 Regional Location Map

in a northeast to southwest direction between two roughly parallel mountain ranges. The Elko Mountain Range to the southeast rises sharply for an additional 2,000 feet above the valley floor, while the Adobe Range to the northwest ascends more gradually to about the same altitude. The topographical features of the actual city site and their implications for the project are discussed in more detail in Section 12.

Economically, Elko functions as the service center for all of northeastern Nevada, an area estimated to contain more than 15,000 people. The rural economy of this extensive area depends largely on cattle and sheep ranching and mining activities. While the economy of Elko itself depends on tourism, local commercial establishments function as a supply center for the surrounding rural area.

HISTORY OF ELKO IN RELATIONSHIP TO THE RAILROADS

Elko is one of the many western cities which owes its formation to a transcontinental railroad. The Central Pacific Railroad, later to become the Southern Pacific Transportation Company (Southern Pacific or SP), reached the sagebrush country where Elko was established as a railroad construction camp late in 1868. Railroaders, freighters and merchants were the first white settlers in the area. But prior to the arrival of the Central Pacific the Humboldt River Valley was the major route for travellers headed west.

For a brief time Elko was the end of the line of the western section of the transcontinental railroad. Then in May 1869 the Central Pacific linked up with the Union Pacific at Promontory, Utah. Shortly after, the railroad began the sale of town lots in Elko to settlers. Freight and passenger traffic developed to serve the surrounding mining district, especially to the south in White Pine County. The town grew very rapidly, and by the early 1870's had a population of about 3,000. The Central Pacific built three large freight depot buildings, to serve the existing freighting operations which gave Elko its original reason for developing. In the 1870's the town had several large hotels, including the Commercial Hotel (which began as the Humboldt Lodging House).

In the early 1880's, the City of Elko was a major meal stop on the Central Pacific Railroad. Passengers were allowed 20 to 30 minutes at the local railroad restaurant for their meal, which had a standardized price of $0.50 to $1.00 while their train took on water and refueled. Elko also became a major livestock shipping center.

In the late nineteenth century the City entered a period of decline, and by the turn of the century the population had dropped to less than 1,000 people. Around the same time Basques from California and the Pyrenees began arriving in Elko mainly to enter the sheep business. The community still hosts the annual National Basque Festival.

The arrival of the Western Pacific Railroad (WP) in 1909, as a competitor to the Southern Pacific, coincided with a number of other events -- new mining camps in northern Nevada were booming and beef and sheep ranching were expanding. By 1917 the town had regained a population of about 2,500, and the following year a municipal government was formed.

With the establishment of the second railroad, Elko was served with several passengers trains per day. The two railroad depots were the focus of community and commercial activity. It was here that passengers transferred from trains to the numerous stage coach lines that served northeastern Nevada. Since there was no alternative method of transportation in the pre-automobile era, Elko's business, mining, and livestock activities were entirely dependent upon rail service.

Central Pacific Railroad, Elko 1870 (Northeastern Nevada Museum, Elko)

Surprisingly, Elko has historical transportation significance not only because of the railroads but it also occupies a position in the history of air transport. In 1920 the city was chosen as an airmail station on the transcontinental route and in 1926 it became the terminus of the first commercial air flight in the nation, from Pasco, Washington.

In the early 1930's a boost was given to the economy by legalized gambling. The Commercial Hotel opened the first lounge and started big name show business in Nevada. The other major hotel/casino in town -- The Stockmen's -- opened in 1944 on the site of the old Mayer Hotel.

Today Elko still functions as a supply center for nearby ranches. It is a transportation center, particularly due to the presence of Interstate 80 and the Western Pacific Divisional headquarters and classification yard. The Western Pacific remains one of the largest local employers. Although Southern Pacific train crews are changed at Carlin, 20 miles distant, many SP employees either live in Elko or depend on it for retail, educational, and professional services.

As discussed in detail in Section 3, the social and economic factors which originally made the central business district directly dependent on close proximity to the railroads have now disappeared. Railroad operations now are in fact a liability and a detriment to community activities in the downtown area. The rights of way occupied by the railroads now have the potential for other and better uses. The railroad operations conducted at grade through the heart of the City are a nuisance which is becoming progressively worse.

PROBLEMS POSED BY THE EXISTING RAILROAD SITUATION

The slow evolution of rail operations over the past century -- from predominantly passenger carriers in the 1870's to almost exclusively heavy freight operation in the 1970's -- and the spectacular population growth of the West Coast, which has generated vast increases in transcontinental freight tonnages, have had very detrimental effects on the quality of community life and on the economic well-being of downtown Elko. This situation is by no means unique -- it exists in almost every moderate-sized western community situated on a major transcontinental rail line.

Today, rail passenger patronage is minimal. Although one Amtrak passenger train in each direction passes through Elko in the late evening hours, these trains stop only on flag. The hotels and commercial establishments which clustered around the once busy railroad depots now draw their livlihood from local trade and from automobile and air traffic. However, their ability to survive is gravely impaired by the noise, disruption, and street blockages created by numerous, heavy freight trains. In the 1970's it is axiomatic that the operation of heavy freight trains through the heart of a community's central business district is incompatible with the ability of that business district to maintain a healthy condition.

The railroads now have a severe disruptive impact on community life in Elko. This conflict has evolved slowly and has become steadily worse over the years. Although the first freight trains in the 1870's operated only a few times a week, and each carried only a few hundred tons, now some 40 daily trains, each drawn by 12,000 or 16,000 horsepower, and weighing up to 8,000 tons, thunder through the City day and night. The average lengths and tonnages of trains on western railroads are substantially greater than is the case on typical railroads in the East, Midwest, or South.

In their present locations, the main lines of both railroads are no longer essential to the economic life of Elko and they pose a host of problems. (See Exhibit 2-2.) They are a hazard, annoyance, and detraction in numerous ways, some measurable, others purely qualitative. Their adverse impacts are more irritating than they would be in other parts of the country because of the greater length of the trains (average train length: 6,600 feet westbound and 4,700 feet eastbound). Among the more serious problems are the following:

- The tracks, with 17 grade crossings (Table 3-1), no fencing along Silver Street, and restricted sight distance at many crossings, are physical hazards to vehicle and pedestrian traffic in the heart of Elko, resulting in a considerable number of accidents, as described in Section 23.
- The frequent blockages and lengthy delays caused by slow-moving trains increase vehicle operating costs to motorists, as described in Section 23.

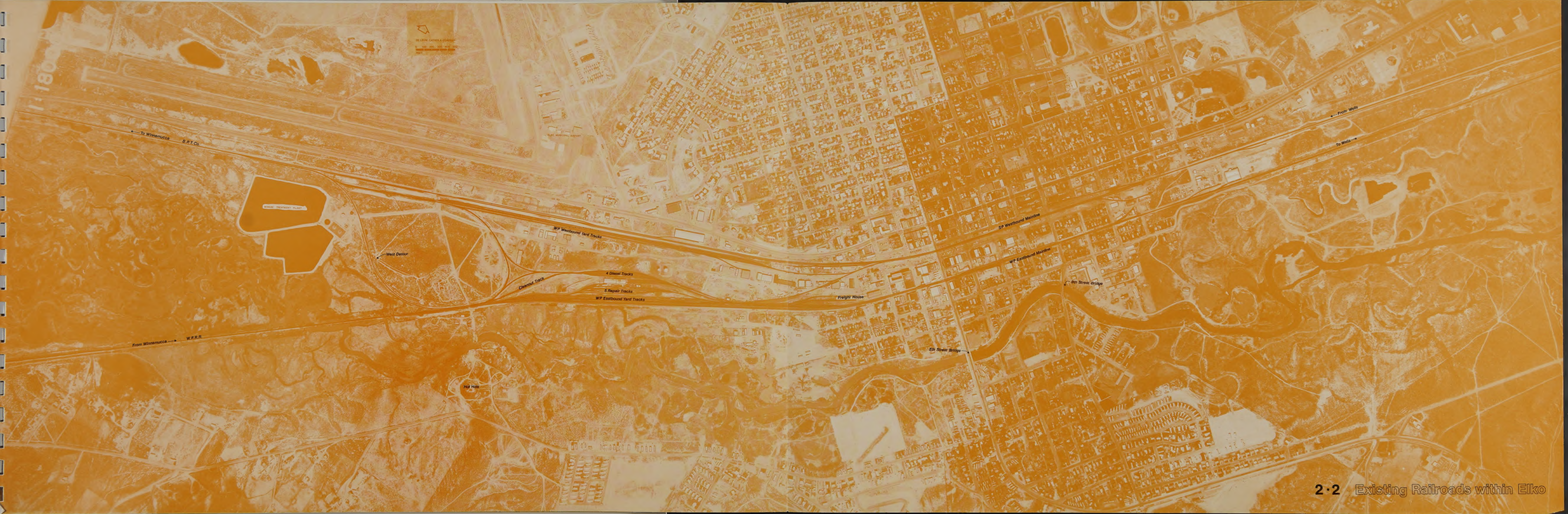
June 28, 1974 - Elko motorists were delayed over 42 minutes as a westbound train blocked crossing through the entire city.

- For emergency vehicles -- police, fire, and ambulance -- the inability to respond to a fire, distress call, injury, or sudden sickness when a train is blocking the streets changes a crisis into a disaster or personal tragedy, as described in Section 24.
- The problem of disruption of traffic and emergency services is particularly serious in Elko. Even under normal railroad operations there could be blockages on two parallel streets -- Commercial and Silver Streets. The situation is further complicated in that on Silver Street there are two eastbound departure tracks from the Western Pacific yard. Trains can occupy both tracks, and after one has left, the second train

Table 2-1

EXISTING RAILROAD GRADE CROSSINGS IN ELKO, NEVADA

Street Crossing	Railroad	
	Southern Pacific	Western Pacific
Second Street	x	
Third Street	x	x
Fourth Street	x	x
Fifth Street	x	x
Sixth Street	x	x
Seventh Street		x
Eighth Street		x
Ninth Street	x	x
Tenth Street		x
Eleventh Street	x	x
Fourteenth Street	x	
TOTAL	8	9
GRAND TOTAL	17	



2·2 Existing Railroads within Elko

can contribute to excessive delay. Under abnormal conditions there is also the potential for a malfunction on the railroad itself -- such as a broken brake hose, signal system failure, or blockage further down the line causing the train to wait until the malfunction is corrected. Such a stalled train would effectively cut Elko in two for the length of the delay, with attendant problems for emergency services. On one occasion in 1972 a Western Pacific train blocked grade crossings for almost 40 minutes; again on June 28, 1974, the community was effectively divided into two parts for 42 minutes by a train waiting for clearance to proceed.

- The numerous existing grade crossings also have adverse impacts on the railroads themselves. All trains operate at relatively low speeds through Elko, because they are either entering or leaving a yard and because of City Ordinance restrictions. This problem is especially burdensome for the Southern Pacific because trains of this carrier would not otherwise be required to slow down through Elko. Furthermore, they are faced with maintenance costs for the 17 grade crossings. Overall the present situation is both costly and inefficient for railroad operations.

- The presence of main line railroads so close to urban development has obvious adverse impacts on surrounding properties. This is particularly the case with the Silver Street line where homes lie within 50 feet of the main line. The adverse impacts include not only the safety hazards but also noise, vibration, air pollution and visual impacts on nearby commercial and residential properties. Residences literally have 16,000 horsepower engines almost in the front yard, while the City's major casino and hotel is located between the two sets of tracks.

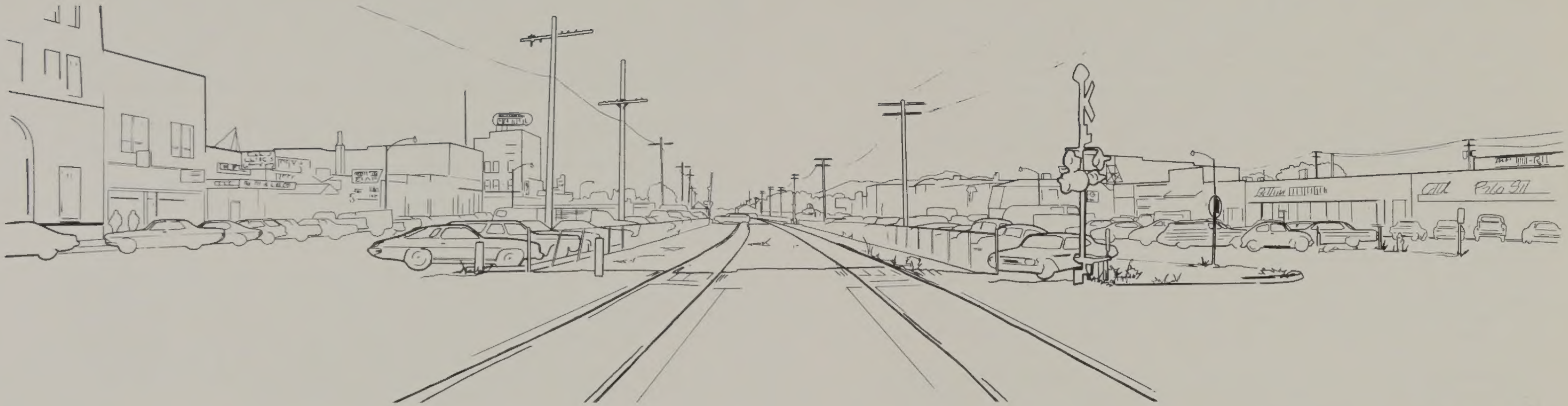
April 25, 1971 - Railroad crossing at 3rd and Silver Streets.

- The Southern Pacific railroad line (between Railroad and Commercial Streets) extending from Third Street to Eleventh Street occupies a particularly significant space. The presence of the railroad virtually eliminates one half block -- eight blocks in length -- from any other use except limited parking. This area is right in the heart of the City and could become the focus of a rejuvenated central business district.

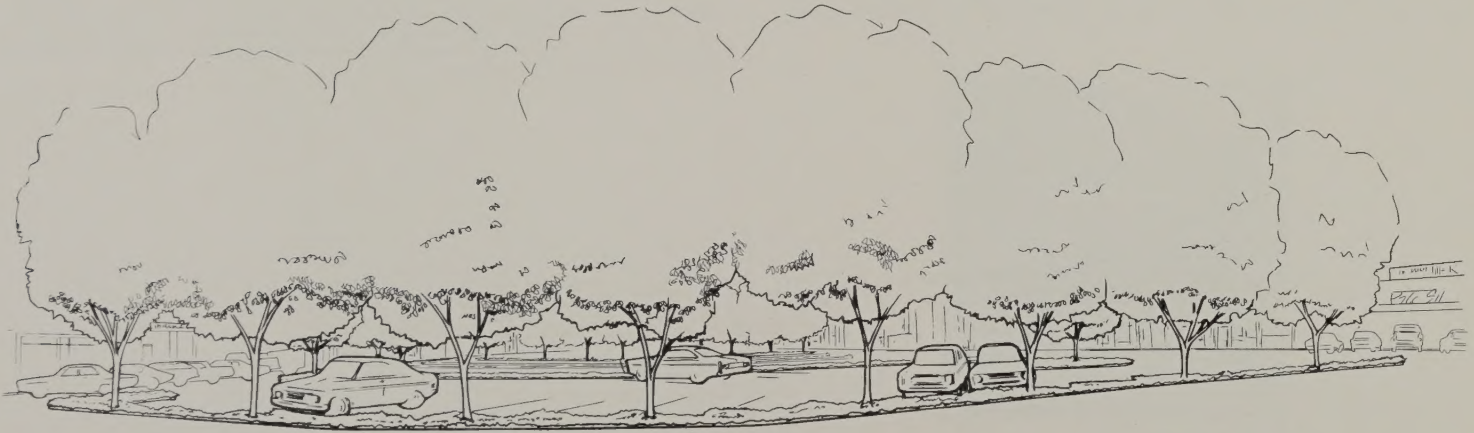
- The Western Pacific railroad, operating by franchise in the middle of Silver Street, effectively eliminates the possible traffic functions the street could perform, with the result that Silver Street, in its downtown location, virtually serves only to provide access to immediately adjacent properties. Because of this, much of the street only has a gravel surface. The Elko City Plan indicates that eventually Silver Street should become a "collector" street.

To summarize, the two railroads, separated by one city block, have long constituted an annoyance to residents; have contributed to numerous traffic accidents and fatalities; and have made it difficult to develop an orderly master plan for development of the downtown business district. The problem created by the Southern Pacific right-of-way is particularly acute and has been a serious blighting influence, since the tracks are immediately adjacent to the major hotels and businesses in downtown Elko.

Elko suffers from the physical division of the City by the two entirely separate rights-of-way of the railroads, and by the Humboldt River. With the integration of operations, and with the established cooperation between the railroads serving local shippers, the next logical step is to consolidate the two lines physically into a single corridor -- to reduce the number of grade crossings, the number of grade crossing conflicts, and the very severe disruption to community life caused by trains operating through the downtown business district.



VIEW FROM 5TH STREET LOOKING EAST DOWN THE EXISTING WPRR RIGHT-OF-WAY



VIEW OF A POTENTIAL DESIGN PLAN FROM THE SAME LOCATION SHOWING THE VISUAL EFFECTS OF TREES PLANTED IN THE PARKING MEDIANS

Part II

Project Presentation and Alternatives

SECTION 3. RAILROAD OPERATIONS AND DESIGN REQUIREMENTS

4. SILVER STREET PLAN - CONSOLIDATION OF TRACKS OF BOTH RAILROADS ALONG THE WP RIGHT-OF-WAY IN SILVER STREET

5. NORTH BANK PLAN - CONSOLIDATION OF TRACKS OF BOTH RAILROADS ALONG THE NORTH BANK OF THE HUMBOLDT RIVER

6. SOUTH BANK PLAN - CONSOLIDATION OF TRACKS OF BOTH RAILROADS ALONG THE SOUTH BANK OF THE HUMBOLDT RIVER

7. OTHER ALTERNATIVE RAILROAD RELOCATION OR GRADE SEPARATION PLANS

8. "NO PROJECT" ALTERNATIVE

9. WP RAILROAD YARD RELOCATION

Section 3

Railroad Operations and Design Requirements

Laying Western Pacific Railroad rails through Elko, December 23, 1908
Source: The Northeastern Nevada Museum, Elko

The Southern Pacific and Western Pacific railroads operate through north central Nevada under a rather unusual cooperative "paired track" arrangement. An understanding of this arrangement, and of related railroad operational requirements and constraints, is essential to the formulation of satisfactory plans for consolidation of the two carriers through Elko.

The Southern Pacific line is a part of the original transcontinental railroad, then known as Central Pacific, and was constructed in late 1868. The town of Elko grew around the Central Pacific depot.

The Western Pacific was built as a competitor to the Southern Pacific, with WP freight service through Elko initiated in 1909.

THE PAIRED TRACK OPERATION

During World War I, the U.S. Government established the "paired track" operation for Southern Pacific and Western Pacific, which called for the two single-track railroads to function essentially as a double-track line between Wells and Winnemucca, Nevada.

Under an agreement dated March 7, 1924, the SP and WP formalized and perpetuated the paired track arrangements initiated during World War I. All eastbound trains of both railroads now operate via WP trackage between Wells and Winnemucca, a distance of 178 miles. All westbound trains operate via SP trackage over a distance of 183 miles.

The tracks are arranged to allow the movement of trains in the direction opposite to the current of traffic in an emergency.

Through Elko, all westbound main line trains of both railroads operate along the SP track in Commercial Street, and all eastbound movements use the WP main line along Silver Street.

The two competing carriers have achieved a high degree of integration of their operations. Functionally, the railroads have achieved many of the operational benefits of a single carrier.

All switching and service to local shippers in Elko for both railroads is handled by a single WP switch engine. Since through trains set off and pick up cars to and from local industries either in the WP yard, or on established set-off tracks, in effect there are no interchange tracks which sometimes generate needless rail movements and unnecessary grade crossings in other communities.

SIGNALS

Both railroads operate through Elko under automatic block signal (ABS) protection. This is a less sophisticated system than remotely controlled centralized train control (CTC), but is entirely satisfactory for a double-track facility.

The ABS system permits switching and main line train movements in the direction opposite the predominant current of traffic, under rules for single-track operation and at maximum speeds of 50 m.p.h. Trains are detoured in the opposite direction in emergencies, such as derailment or track washouts on one of the two lines. This flexibility helps assure the continuity of rail service across Nevada under almost any conceivable emergency condition.

TRAIN MOVEMENTS

Western Pacific operates from four to six freight trains daily westward, and five trains eastward. Corresponding figures for Southern Pacific are about 15 per day. This gives a total of around 40 trains per day, although these numbers increase somewhat during the fruit and vegetable shipping season.

In addition, local switching service generates around four trips through the downtown area in each direction on a typical day.

TABLE 3-1

TYPICAL DAILY TRAIN MOVEMENTS THROUGH DOWNTOWN ELKO

Railroad and Direction	Number*
SP eastbound	14
WP eastbound	5
SP westbound	16
WP westbound	4 to 6
WP switching, eastbound	4
WP switching, westbound	4
Total approximately	50

---

*Number of train movements subject to seasonal variation.

As will be noted from the number of train movements and from the gross tonnage statistics, approximately 77 percent of the freight movements through Elko are handled by Southern Pacific, and 23 percent by Western Pacific. Thus, the SP is the dominant carrier, but as described elsewhere, local switching in Elko is handled exclusively by the WP.

PASSENGER SERVICE

Amtrak transcontinental train service (one train in each direction) is operated through Elko by Southern Pacific train crews, operating westward on SP trackage and eastward on WP. Amtrak stops at Elko only on flag. Informal observations indicate that not more than two passengers a day patronize the eastward train from Reno-Sparks, which arrives in Elko at 9:00 p.m. There are rarely any passengers arriving on or boarding the westward train, which passes through Elko at 1:30 a.m. It is apparent that there is only a minimal requirement for passenger depot facilities in Elko, although space should be reserved for a future depot, and a passenger loading platform should be incorporated in any initial construction

TRAIN SPEEDS

Westbound trains are restricted by City ordinance through Elko to 35 m.p.h. until the engine clears Third Street. At this point, the train accelerates, so that the caboose clears the crossing at an appreciably higher speed, except for trains entering the WP yard.

Because of safety and limited visibility, eastbound trains operating along Silver Street are restricted to a maximum speed of 15 m.p.h., with the train accelerating after the engine clears the Eleventh Street grade crossing. Since all Western Pacific trains are required to stop in the yard, WP is not seriously inconvenienced by the local speed restrictions, but the low speed limit is a deterrent to the expeditious movement of Southern Pacific trains.

HISTORICAL TRENDS OF TRANSCONTINENTAL FREIGHT TRAFFIC THROUGH NEVADA, AND FUTURE PROJECTIONS

The paired transcontinental tracks of Southern Pacific and Western Pacific across central Nevada constitute one of the most densely and heavily traveled sections of railroad in the Western United States, with recent gross tonnages approximating 61,000,000 tons per year in both directions. The only segments of the Western rail network which carry comparable tonnages include the Southern Pacific main line between Sacramento and Roseville, the joint Santa Fe-Southern Pacific track between Bakersfield and Mojave, California; the Southern Pacific main line between Los Angeles and Yuma, Arizona; and the joint Santa Fe-Union Pacific main line between Barstow and Riverside, California.

Table 3-2 and Exhibit 3-1 show the historical increase of two-way gross rail tonnage across Nevada since 1939. It should be noted that a 20 percent increase in gorss tonnage was experienced in the 14-year period 1959 through 1973. Growth in transcontinental rail freight traffic has roughly paralleled the population growth on the West Coast. It would not be unreasonable to anticipate that the recent growth trend will continue, and gross

Table 3-2

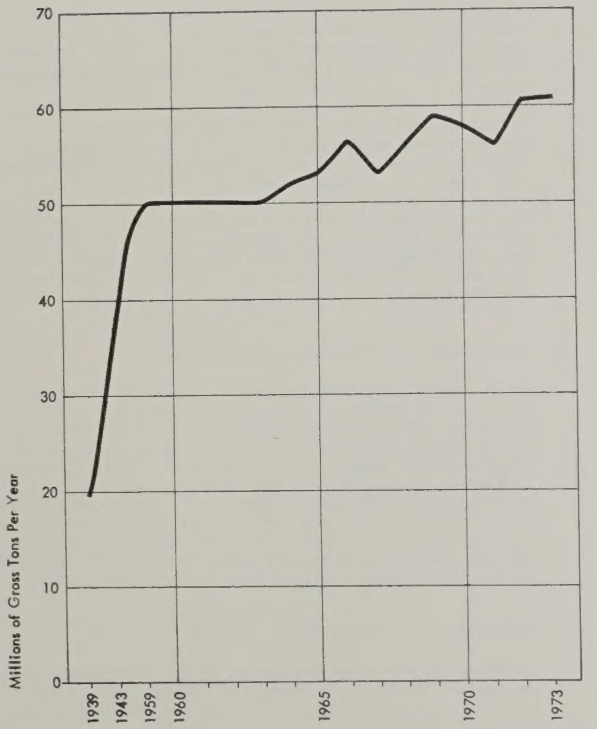
HISTORICAL TREND OF RAILROAD TRAFFIC THROUGH ELKO, NEVADA,
MILLIONS OF GROSS TONS PER YEAR HANDLED ON ALL TRAINS, CARLIN TO ALAZON (WELLS)

	Southern Pacific		Western Pacific		
Year	Eastbound	Westbound	Eastbound	Westbound	Total
1973	25,444,000	21,173,000	7,160,000	7,155,000	60,932,000
1972	26,468,000	19,899,000	7,152,000	7,348,000	60,867,000
1971	24,520,000	18,769,000	6,666,000	6,646,000	56,601,000
1970	25,320,000	20,389,000	6,065,000	6,508,000	58,282,000
1969	24,697,000	20,099,000	7,301,000	7,097,000	59,194,000
1968	24,738,000	18,306,000	6,324,000	7,110,000	56,478,000
1967	23,533,000	17,479,000	5,688,000 *	6,711,000	53,411,000
1966	25,165,000	18,368,000	5,894,000 *	7,120,000	56,547,000
1965	23,976,000	17,356,000	5,539,000	6,594,000	53,465,000
1964	23,456,000	17,734,000	5,162,000	6,142,000	52,494,000
1963	22,289,000	16,266,000	5,221,000 *	6,272,000	50,048,000
1962	22,750,000	16,301,000	4,984,000 *	5,983,000	50,018,000
1961	23,316,000	16,357,000	4,877,000 *	5,633,000	50,183,000
1960	24,114,000	15,844,000	4,730,000 *	5,609,000	50,297,000
1959	24,517,000	15,439,000	4,769,000 *	5,568,000	50,293,000
1943	13,696,000	13,927,000	5,428,000	--------	38,479,000 (1)
1939	7,522,000	5,161,000	3,385,000	--------	19,453,000 (1)

---

(1) For years in which westbound WPRR tonnage is not tabulated, the total is calculated with the assumption that westbound and eastbound tonnages were identical.

Source: Southern Pacific Transportation Company, except as noted.
* Western Pacific Railroad Co.



3-1. HISTORICAL TREND OF RAILROAD TRAFFIC THROUGH ELKO, NEVADA tonnages on the order of 80,000,000 tons per year can be projected for the year 2,000 A.D., or an increase of one-third over the present traffic volume.

This projection should be regarded as conservative, as changes in the availability of fossil fuels on the West Coast could radically change the picture. During the last 50 years practically no coal has been burned in fossil-fueled West Coast power plants. However, with the declining supplies and increasing prices of petroleum, an extremely heavy movement of coal from Rocky Mountain sources to the West Coast is regraded as a strong possibility by the end of the century. Such a movement might readily add another 10 to 15 million tons per year to the gross tonnage figures projected above.

A related development could be the implementation of a national transportation and energy conservation policy, or the operation of natural economic forces, under which a considerable amount of existing long-distance truck transport would be diverted to rail.

For the purposes of computation of delays at grade crossings, future passenger train traffic is projected to remain as a negligible factor, not exceeding the present one Amtrak train per day in each direction. However, there is a possibility that Amtrak service may increase to two trains in each direction daily.

PROJECTIONS OF NUMBER OF FREIGHT TRAINS

It is impractical to estimate the number of freight trains needed daily to carry the projected gross freight tonnages. There are wide differences of opinion among railroad management officers regarding the comparative merits and economics of operating a larger number of shorter, faster, lighter trains versus long, slow drags. These decisions will also be influenced by future railroad labor agreements, and by the availability and types of future motive power, including possible future electrification. In any event, the total delays experienced by motorists at the several grade crossings in Elko, and the divisive effects on the community, are expected to vary directly as a function of future gross tonnages of transcontinental rail freight and vehicular volumes.

SOUTHERN PACIFIC OPERATIONS

Southern Pacific operates across Nevada from Ogden, Utah, on the east, to Sparks, Nevada, and thence over Donner Pass to California. Southern Pacific also enjoys trackage rights via the Western Pacific between Flanigan (north of Pyramid Lake) and Winnemucca, primarily for eastward lumber movements from the Pacific Northwest to the Midwest.

The nearest terminal for inspection and for change of train crews and engine crews is at Carlin, approximately 20 miles west of Elko. Thus, most SP freights pass through Elko without stopping. Only the SP freights, which set off or pick up occasional cars for local industries, stop at Elko.

We explored the possibility of consolidating the Southern Pacific and Western Pacific yard facilities in Elko and Carlin to a central location. However, Southern Pacific officers indicated that the run from Sparks to Carlin involves about the maximum mileage that can be completed within the Federal Railroad Administration workday limit of 12 hours, and that moving the terminal to Elko probably would be infeasible.

The SP track facilities through Elko consist of the main line, laid with heavy 132 lb./yd. rail, with bolted joints, plus what was once a long passing track, giving the appearance of a double main line track at the four downtown grade crossings. The turnout at the east end of the former passing track has been removed, and this track is now used only for switching and for access to the Western Pacific yard.

Southern Pacific claims ownership of most of the land between the theoretical street lines of Railroad Street and Commercial Street. The actual operating area consists of a 40-foot strip between chain link fences, which extend from Third to Sixth Streets, with the remainder of the right-of-way leased by SP for parking.

All Southern Pacific downtown grade crossings have Std. No. 8 automatic flashing light signal protection. The signal circuits activate these flashers for an excessive period of time before the train arrives at the crossing, with the result that the signals are frequently ignored.

Westbound Southern Pacific freight train rolling through downtown Elko

GRADES AND MOTIVE POWER

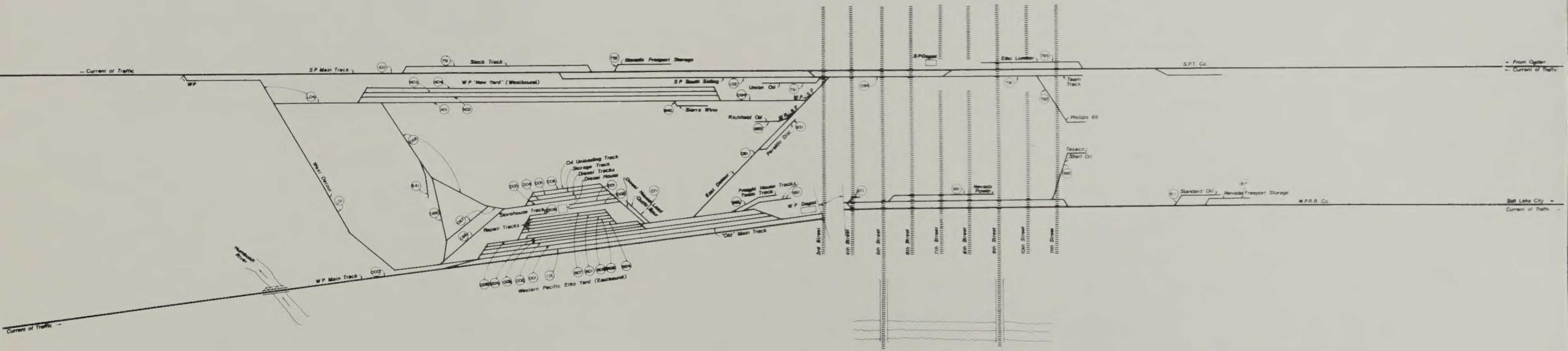
The maximum tonnage and minimum motive power (horsepower) requirements for a freight train operating on Southern Pacific between Sparks and Ogden is governed by the "ruling grade," which is 0.4 to 0.425 percent on the Southern Pacific. (A mountain grade on the SP east of Wells, Nevada, does involve substantial grades of 1.4 percent eastbound and 1.35 percent westbound, but helper engines can be utilized as required to assist heavy tonnage trains negotiating this grade.) Southern Pacific engineering officers have advised the consultant that a 0.4 percent grade, compensated for curvature, is the maximum acceptable through Elko; introduction of a steeper grade would necessitate a second helper district for maximum tonnage trains.

Ruling grade is 1.0 percent on the Western Pacific.

Through Elko, both Western Pacific and Southern Pacific are on relatively flat grades, ascending toward the east at approximately 0.13 percent.

EXISTING WESTERN PACIFIC RAILROAD OPERATIONS AND ELKO YARD

Since any track relocation plan necessarily affects the Western Pacific Elko yard, an explanation of the present functions and activities of this yard is essential for an understanding of the implications of the specific track consolidation plans discussed in this report. As shown on Exhibit 3-2, this yard presently serves several functions, as follows:



3·2 Schematic of Existing Western Pacific Yard

1. Major operating headquarters for all Western Pacific Railroad operations in Nevada and Utah. The yard is the major point of car supply for local shippers throughout eastern Nevada, storage of maintenance-of-way equipment and outfit cars, and storage of the wrecker train. Elko is the only road crew change point for Western Pacific between Portola, California, and Salt Lake City. In the late 1960's, all dispatching was transferred to Sacramento, but Elko remains as the WP Eastern Division headquarters, with administrative jurisdiction from near the California State Line to Salt Lake City. (Although Salt Lake City is the easterly terminus point of the Western Pacific, the WP maintains no major yard facilities there. Rather, all local switching, classification, servicing, and making up of WP trains in the Salt Lake City area are performed by the Denver & Rio Grande Western Railroad in the latter's Roper Yard.)

2. Local industry support yard for distribution of inbound cars to, and pick up of outbound cars from, all local Western Pacific and Southern Pacific shippers. Western Pacific does all switching in Elko for Southern Pacific - which has no yard facilities, freighthouse, or switch engine in Elko. Westbound SP trains set off their cars for local switching at the Ninth Street team track, and eastbound SP trains set off their cars in the Western Pacific eastbound yard.

3. Minor classification yard for assembling blocks for trains. One switch engine, permanently assigned to Elko, operates two shifts per day (daytime and late afternoon). The switch engine classifies one eastbound and one westbound local train per day and provides local switching service to all local Southern Pacific and Western Pacific shippers.

4. Car repair center. Although major engine servicing activities at the WP diesel engine shop in Elko have been transferred to other locations, the engine house now houses programs involving the upgrading of steel gondola cars, modernization of air brake systems on certain cars, and similar programs.

5. Fueling and other minor servicing of diesel locomotives.

6. Elko yard makes the mandatory ICC 500-mile inspection on all eastbound and westbound WP trains. This is the only point between Salt Lake City and California where WP trains are thoroughly inspected. Inspection is generally performed on the main line, and requires not less than ten minutes and sometimes as long as one hour for each train. (This operation occasionally ties up SP following trains which otherwise would not stop at Elko.)

The Western Pacific freighthouse is used for local freight, including wool storage.

Western Pacific's superintendent has reasonably direct radio communicati with all switch engines and road engines, except that there are some difficulties encountered due to motive power pools, including diesel units from foreign railroads, such as D&RGW and Union Pacific, which do not have compatible radio channels. However, all power units are expected t have compatible channels in the near future.

Since all Western Pacific trains must stop in the Elko yard, this involve rather slow exit movements out of the yard, with adverse effects on, and lengthy delays at, the nine grade crossings along Silver Street.

Nearly all eastbound WP trains depart on the "new main line," on the south side of Silver Street, laid with 119 lb. rail with bolted joints. However, some trains depart from the "old main line" in the north half of Silver Street (laid with 85 lb. bolted rail) and are held by the signal at the Wye east of Twelfth Street until the eastbound main is clear.

IMPORTANCE OF WESTERN PACIFIC TO ELKO'S ECONOMY

Western Pacific is one of the major industries in Elko. Any track relocation plan must be designed to preserve the present efficiency and integrity of Western Pacific's operations. Western Pacific is a major employer in Elko, with 140 to 150 employees assigned to local office, maintenance-of-way, yard, car repair, and train operations. This number is expected to increase somewhat in the future, as train crews and their families relocate from the Wendover, Utah yard, which is being phased out as a crew change point.

RAIL ORIENTED SHIPPERS

The dominant rail shipper in the Elko area is the Nevada Freeport Warehouse Company, which operates a dry storage warehouse served by SP at the west end of the City and a refrigerated warehouse served by WP at the east end of the City. Approximately 35 percent of local rail movements involve cars going to and from this shipper. Annual shipments to Nevada Freeport Storage Company total around 400-500 cars. The refrigerated warehouse currently stores large quantities of frozen foods.

The Nevada Freeport Storage Company warehouses shipments en route, offers in-transit storage, and also breaks bulk and reloads cars under through freight rates, particularly liquors. It is expected that the two warehouses of Nevada Freeport Storage Company will remain indefinitely and will require equivalent access and service to that now received.

Other rail shippers in Elko, all relatively minor, are:

1. Loading of ore from local mines. Ore loading is often sproadic, depending on the opening and closing of mines in eastern Nevada and southern Idaho and variations in prices of minerals.
2. Livestock, once the dominant rail business from Elko, is being phased out. No livestock rail shipments are expected in the future.
3. A cement company plans to use Southern Pacific's livestock spur for the unloading of cement cars for Interstate Freeway construction during the next three of four years.
4. Acid products for use in the mining industry are sometimes unloaded at one of the loop or "detour" tracks at the west end of Western Pacific's yard.
5. A local dealer of tracked agricultural and construction equipment has requested construction of a ramp to permit the direct loading of tracked machines.
6. Several distributors of gasoline and other petroleum products, including Shell, Arco, Union, Phillips, and Standard Oil, have spur tracks at their bulk plants for unloading tank cars. Most of these spurs appear to be active, although most gasoline moves into Elko by truck.
7. Several shippers utilize the public team tracks of the two railroads. (These are loading or unloading tracks which are available to any shipper who does not have direct access to a private rail siding and should be located where they are most convenient to the majority of shippers.) The Western Pacific team track is located at the WP freighthouse. The Southern Pacific auxiliary track on the south side of the main line, in the block between Ninth and Eleventh Streets (near the passenger deport), functions as the team track.
8. None of the shippers with private spurs in the downtown area between Third and Eleventh Streets generate as many as 50 carloads per year, and in one instance less than ten carloads per year.
9. There is very little LCL (Less than Carload) business.

At the present time approximately 1,200 revenue cars are picked up or set off in Elko annually. Of these, distribution to various shippers according to geographical area is as follows:

	Number	Percentage
Public SP and WP team tracks	64	5%
Private spurs west of Third Street and east of Eleventh Street	1,020	84%
Downtown shippers situated between Third and Eleventh Streets	124	11%

Under any of the plans which would involve removal or relocation of the tracks along Silver Street or elsewhere, the industries of concern would be confined to those located between Third and Eleventh Streets.

The foregoing statistics relate to revenue cars only, and exclude any cars devoted to railroad company service.

The period of greatest rail activity includes the months of September, October, and November.

EXISTING RAILROAD RIGHTS-OF-WAY IN ELKO, FRANCHISES, AND POLICIES APPLICABLE TO THEIR REDEVELOPMENT FOR OTHER USES

Certain fundamental principles of public policy, as well as legal complications arising from the original acquisition of the existing railroad rights-of-way in Elko, influence the future uses of the rights-of-way following track removal, and affect the ownership under which such released rights-of-way may be vested in the future.

The accepted public policy, in cases of purchase by a public agency of a new right-of-way to be conveyed to a railroad, calls for the existing right-of-way owned by the railroad company to be exchanged to the public agency. Otherwise, if commensurate financial participation in the project were not forthcoming from the railroad, such conveyance of public property to the railroad would be tantamount to a gift of public funds to buy new rights-of-way for the benefit of a private company.

In Elko, the legal conditions under which the original rights-of-way were acquired differ for the two railroads as follows:

Southern Pacific

The right-of-way now occupied by the Southern Pacific was granted to the Central Pacific Railroad by the Pacific Railroad Act, enacted by the U.S. Congress on July 1, 1862, and signed into law by President Abraham Lincoln. The Central Pacific was one of the earlier, but not the first, of the land grant railroads. Since some of this right-of-way would be abandoned or relinquished under the proposed track relocation plan, a legal question arises as to the reversionary rights of the United States Government to the released right-of-way.

Western Pacific

The Western Pacific right-of-way was obtained in fee in the early 1900's, primarily through purchase or donation of privately owned property through Elko. In the Elko area, therefore, there is no particular problem regarding the legal right of Western Pacific to dispose of any real estate which might become surplus.

Along Silver Street through downtown Elko, Western Pacific operates under the terms of a 50-year franchise granted by Elko County on October 7, 1907. This franchise expired in 1957 and has never been renewed.

Policies Applicable to Right-of-Way Redevelopment

In view of the legal uncertainties involved, it is assumed for the purposes of this report that the Southern Pacific property, which is by far the more significant of the two rights-of-way in the downtown area, must remain in public ownership and be devoted to some public use.

In the case of former Congressional Land Grant property, subsequent legal action or legislation may be necessary to determine the public agency in which the ownership of such land would be vested, that is, the City, County, State, or Federal Government.

If it is desired to make such Congressional Land Grant property available for future sale to a private party, special federal legislation might be required. In the latter case, the anticipated proceeds of such private sale or the value of such released or abandoned railroad rights-of-way, if eventually made available for commercial development, should serve as a credit offsetting a portion of the gross cost of the track relocation project.

In Lodi, California, disposal of Federal Land Grant rights-of-way has occurred by enactment of special bills in the U.S. Congress.

Any released Western Pacific properties could be sold or utilized for private commercial or industrial purposes.

The street right-of-way occupied by Western Pacific along Silver Street under the terms of the County of Elko franchise will revert to City ownership upon removal of the track.

Where right-of-way exchanges occur between a public agency and a railroad, a determination would be made at a later date as to whether the exchange would be based on equivalent areas, equivalent market values, or some other basis.

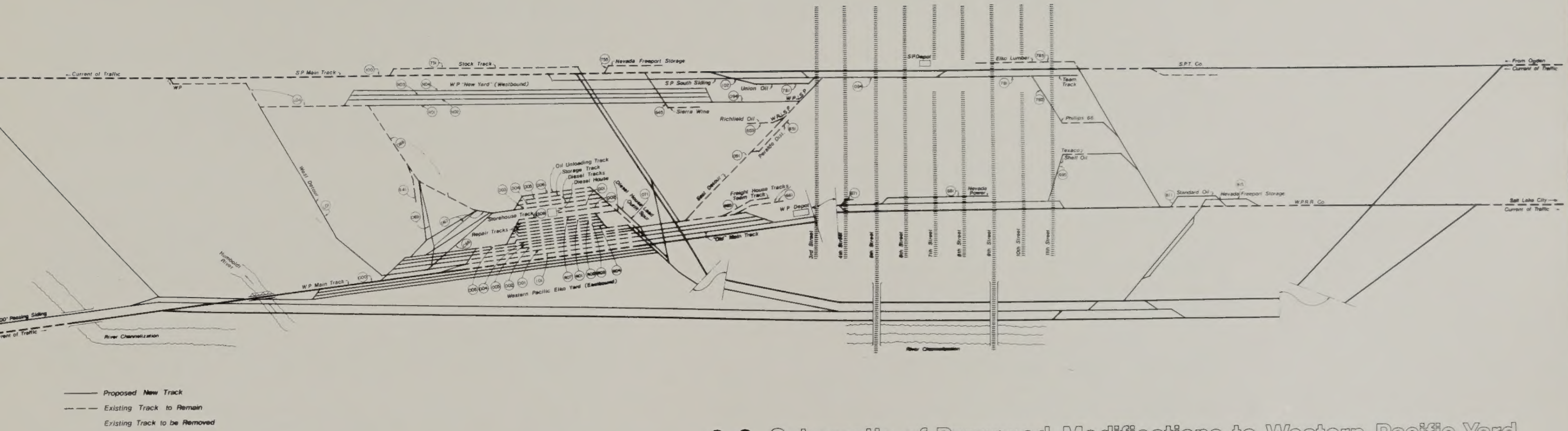
PROPOSED MODIFICATIONS TO WESTERN PACIFIC YARD AND CLASSIFICATION OPERATIONS (See Exhibit 3-3)

The present Western Pacific Elko yard is obsolete and somewhat inefficient to operate. If the yard is to remain within the city limits of Elko, the track consolidation project will precipitate the need to make extensive track changes. Therefore, the preliminary conceptual track layouts discussed in this report are intended to be compatible with modern railroad operating practices and the contemplated future use of the yard.

The most serious shortcoming of the present yard is its inadequate length. With auxiliary tracks at the Elko yard having a maximum length of only 4,100 feet, the yard cannot accommodate trains of the maximum length now operated or expected to be operated on Western Pacific, namely, trains of up to 180 cars, having a length of about 9,000 feet. Several WP sidings of about 6,700 feet occur at intervals of about ten miles between Portola, California, and Salt Lake City. Thus, long trains cannot be handled into the Elko yard without breaking or doubling. SP and WP occasionally operate trains from 143 cars to 160 cars in length, which would require some 8,000 feet in a passing track, so one of the basic features to be incorporated in any track rearrangement plan is that of longer passing and auxiliary tracks.

The second basic feature to be incorporated in the track rearrangement reflects the anticipated future use of this yard, which would be a central point for eastbound classification or car sorting. At the present time most of Western Pacific's freight car classification or sorting work occurs at various yards in California, both for eastbound and westbound movements. Eastbound trains now classified in California move directly to Salt Lake City, with only occasional cars being picked up or set off at intermediate points through Nevada.

Western Pacific officers are presently giving serious consideration to major changes in these operations. Specifically, it is contemplated that westbound trains will continue to be classified in California, but a major portion of the eastbound classification work will be transferred to Elko. Tentatively, six eastbound trains would be classified daily at Elko, which will remain as a flat yard. This will substantially increase



3·3 Schematic of Proposed Modifications to Western Pacific Yard

the amount of railroad activity in Elko, and, among other things, will require the full-time assignment of two switch engines and the establishment of a pool of road engine motive power.

These eastbound trains can be classified either in the existing yard (as expanded, lengthened, and remodeled), or in an entirely new yard situated about four miles east of Elko. In the opinion of WP management, the number of cars requiring classification does not justify construction of a hump or gravity switching yard in Elko.

A third basic feature of the track consolidation and yard modification relates to the diagonal alignment of the relocated Southern Pacific westbound main line west of Third Street. The alignment shown has been selected to avoid interference with the existing Western Pacific diesel engine servicing tracks and the car repair tracks, and to retain as much of the track capacity in the existing eastbound classification tracks as feasible. However, any practical alignment necessarily cuts through and requires complete relocation of the trackage in the WP westbound yard, which consists of four long parallel tracks, averaging 4,500 feet each.

These proposals for lengthening and rearrangement of the yard are depicted on Exhibits 4-1, 5-1, and 6-1. The general layout has been discussed with the Western Pacific, and substantial agreement in principle has been received from the WP Engineering Department, although details need to be refined. Essentially, the plan calls for the complete elimination of the separate westbound yard, and the extension and relocation of existing body tracks in the eastbound yard, so that all Western Pacific yard activities can be concentrated in a single longer, more compact and efficient flat yard.

DESIGN CRITERIA FOR REMODELED WESTERN PACIFIC YARD

1. Duty: To classify five to six eastbound trains per day, involving approximately 400 to 500 cars in 24 hours.
2. Spacing: Main line to be separated from nearest adjacent track by 20 feet, to allow Southern Pacific trains to operate at optimum speed, without slowing for yard restrictions. Inspection tracks to be spaced at 20-foot centers, with paved roadways to facilitate inspection from motor vehicles.
3. Track requirements:

   2 inspection tracks with paved roadways.
   5 makeup tracks, 125-car capacity, usable length 6,500 feet. (crossover at midpoint of the long tracks would be useful to allow insertion of cuts)
   1 makeup track for "shorts," 20 to 30-car capacity.
   1 cleaning track, approximately 1,000 feet long.
   8 classification tracks, each not less than 4,000 feet long.

4. Switching tails should have length of about 4,000 feet.
5. Passing track or siding: One of the auxiliary tracks and the leads to the yard should be so arranged that 9,000 feet is available to allow a train of this length to be accommodated without encroaching upon the main line.
6. Existing tracks in engine service area, cleaning track (1,000 foot length), car repair (RIP) tracks, and maintenance of way set-out, to remain without change.
7. Functions housed in the SP depot, now closed, to be transferred to the relocated WP depot which remains for WP office use.
8. Provide loading platform only for Amtrak patrons, with space reserved for possible future depot.

DESIGN CRITERIA FOR MAIN LINE AND AUXILIARY TRACK RELOCATION

1. Maximum curvature - 2° on main line; -15° on industrial sidings.
2. Minimum tangent length between ends of reversing curves (measured between ends of spirals) = 200 feet.
3. Design speed - 60 mph, with spirals of sufficient length to allow future adjustments in superelevation corresponding to design speed of 65 mph. (For a 2° main line curve, the foregoing calls for 122 feet of spiral beyond the end of the simple circular curve. On preliminary drawings which show only simple circular curves, tangent distance between the ends of reversing curves may be taken as approximately 122 feet + 200 feet + 122 feet = 450 feet.)
4. All turnouts and crossovers in main line track to be located in tangents, or within ends of spiral where superelevation is nominal.
5. Drill and auxiliary tracks to be located to minimize movements on or across the main line. The majority of yard and local switching operations must not encroach onto the mainline. (The few movements required to serve industries north of the relocated Southern Pacific main line will occur through one crossover, A continuous drill track connects all industry spurs in this area, and switching movements back and forth across the relocated SP main line are minimized.
6. Minimize number of turnouts on main line tracks which must be power operated or electrically locked and interconnected with the signal system.
7. Preserve the capability in an emergency to detour trains in the direction opposite to the predominant current of traffic.
8. Weight of rail - New SP main line-136 lb. continuous welded (CWR)
   New WP main line-136 lb. continuous welded (CWR)
   Yard tracks and auxiliary tracks-second hand, 85 lb., or heavier, jointed or welded rail.
9. Minimum right-of-way width for main line trackage -

   In developed areas - 80 feet
   Outside developed areas - 100 feet

OWNERSHIP OF RELOCATED TRACKAGE

At the present time all tracks in Elko are owned either by the SP or the WP; there are no jointly owned tracks. Because of the integrated operation in Elko, with the one switch engine serving both railroads, no attempt has been made to keep all new tracks under a single ownership. Rather, it is recommended that new auxiliary tracks serving spurs now owned by different railroads will be jointly owned.

However, the individual industry spurs will continue under SP, WP, or private ownership. Each railroad will retain its present rights to solicit shipments originating or terminating on these spurs. In other words, there will be no change in the shares of freight business now enjoyed by Southern Pacific and Western Pacific, respectively, and neither railroad should gain any competitive advantages over the other through any track relocation and consolidation plan.

The new eastbound main line will be owned by Western Pacific, and the new westbound main line by Southern Pacific. Any new right-of-way could be split into two longitudinal strips, with the southerly strip to be converyed to WP and the northerly strip to SP.

BASIS FOR RAILROAD TRACKWORK ESTIMATES

Since most of the trackwork will be located within the existing Western Pacific yard, Western Pacific engineering officers are of the opinion that the construction work would be done primarily by Western Pacific labor forces. The existing labor agreements between the railroad and the maintenance of way brotherhoods call for certain job protection for the employees.

The estimates contained in this report for trackwork are adapted primarily from unit prices made available to us by the Western Pacific engineering department. We have added our own allowance to reflect inflation and contingencies, based on the assumption that the actual construction work will be performed during the 1978 calendar year.

Principles Used in Allocating Trackwork Costs Between "Replacement-in-Kind" and "Betterment" Components

The generalized diagrams and exhibits depicting railroad trackwork in this report, particularly for the Western Pacific Yard, show the ultimate conditions, with the yard expanded to the capacity desired by Western Pacific. The proposed yard would be larger and have a greater car capacity than the present yard. Thus, the proposed trackwork layouts are comprised in part of replacements of existing facilities in kind, and in part of additional tracks which would be construed as betterments.

For the purposes of preparation of cost estimates, the following principles have been utilized to segregate the cost of replacement of rail facilities in kind (to be paid for by public) from the cost of "betterments" (to be borne by the railroads).

Items of Trackwork at Cost of Track Relocation Project

1. Adjustments to or realignment of industry spurs to maintain rail access to existing shippers.
2. Replacement of body tracks and car storage tracks in kind, to the extent that the railroad has the same freight car storage capacity in the "after" condition as in the "before" condition.
3. Relocation of main line tracks as required throughout the entire length of the project.
4. New auxiliary tracks, ladder tracks, engine thoroughfare tracks, and similar operating tracks, as required to preserve the same functions and convenience of access now available in the present yard, irrespective of comparative lengths of track involved.
5. Replacement of passing tracks in kind, to provide the same length of track between clearance points for passing as is now available.

Trackwork Not a Part of the Project - Betterments

1. Lengthening of passing tracks beyond existing restricted lengths.
2. Additional body tracks, extensions to classification tracks, and other car storage tracks, in excess of the present storage capacity of the yard described in sub-paragraph 2, above.
3. Any other new tracks or other facilities to accommodate an operating function not presently at Elko.
4. Incremental cost of heavier rail to replace lighter existing rail, e.g. 136 lb. rail replacing 119 lb.

The basic conceptual plan for remodeling and extending the existing Western Pacific Yard is substantially identical for the three separate relocation plans -- Silver Street, North Bank, and South Bank -- studied in detail in this report. The only differences occur in the orientation of the several track leads at the east throat of the yard. The proposed remodeling program consists of retaining some existing tracks in service, removing other tracks, relocating tracks, extending certain tracks, and adding tracks. Table 3-3 summarizes in general terms the significant details of the principal tracks involved. Revisions to industry spurs are excluded from the tabulation.

In summary, the tabulation shows that the existing yard has approximately 50,500 linear feet of trackage. The proposed remodeled yard has about 65,900 linear feet of track, of which 50,500 would be existing track or replacements in kind, and about 15,400 track feet would reflect additional track capacity, the cost of which, in our opinion, should be the responsibility of the railroad.

Comparative lengths of trackwork involved in the rearrangement of the main lines of the two railroads are as follows:

Alignment	Track Footage	
	SP	WP
1. Silver Street	12,900	12,680
2. North Bank	13,570	13,165
3. South Bank	13,770	13,365

Note: All alignments include a 4000' yard lead.

Table 3-3

WESTERN PACIFIC CLASSIFICATION YARD, ELKO, NEVADA
COMPARATIVE CAPACITY BETWEEN EXISTING LAYOUT VS: REMODELED AND EXTENDED CONFIGURATION

(Arranged in order from north to south)

			Proposed Remodeling		
Track Identification Program No.	Existing Function	Existing Length (feet)	Replacement in Kind (feet)	Betterments Increased Capacity (feet)	Remarks
NO 4	Westbound Yard Track	4200	0		To be removed
NO 3	Westbound Yard Track	4400	0		To be removed
NO 2	Westbound Yard Track	4700	0		To be removed
NO 1	Westbound Yard Track	4800	0		To be removed
DO 6	Oil Track	1200	1200		No change
DO 5	Relief Outfit Track	800	800		No change
DO 4	Service Track	1200	1200		No change
DO 3	Service Track	900	900		No change
DO 2	Diesel House	700	700		No change
DO 1	Diesel House	800	800		No change
RO 7	Repair Track	1700	1700		No change
RO 1	Repair Track	1400	1400		No change
RO 2	Repair Track	1100	1100		No change
RO 3	Repair Track	1100	1100		No change
RO 4	Repair Track	1200	1200		No change
005	Eastbound Yard Track	1700	3700		Add 2000' to west
004	Eastbound Yard Track	2000	3900		Add 1900' to west
003	Eastbound Yard Track	2700	4000		Remove 1600'; add 2900'
002	Eastbound Yard Track	4600	4100		Remove 1300'; add 800
001	Eastbound Yard Track	4600	4200		Remove 1400'; add 1000'
101	"Old" Main Line	4700	4300		Use 2300' of existing and add 2000' to the west (change to yardtrack)
000	WP Main line	-	4400		Use 2400' of existing and add 2000' to the west (change to yardtrack)
-			800	4500	New make-up and inspection track
-				5400	New make-up and inspection track
-				5500	New make-up and inspection track
			9000		New passing siding; 5400' available as make-up and inspection
TOTALS		50,500	50,500 ft. Existing and replacement in kind, at cost of project.	15,400 ft. Betterments, at expense of railroad	

Notes: 1. Lengths shown approximated to the nearest 100 ft., measured from headblock to headblock of switch.
2. Tracks shown exclusive of new main lines.
3. Industry spurs not included; to be revised as regained.

Section 4

Silver Street Plan

Consolidation of Tracks at both Railroads along WP Right of Way in Silver Street

INTRODUCTION

This plan calls for the Western Pacific main line to be shifted laterally to the south from its present position in Silver Street between Second and Twelfth Streets, and for the Southern Pacific to be relocated parallel to Western Pacific on the north, generally in the space now occupied by WP's so-called "old Main Line," which consists of light, old 85 lb. rail.

Since the relocated Southern Pacific main line would cut through the center of the WP westbound yard, destroying its usefulness, substantially the same comprehensive modifications and extensions to the existing eastbound WP yard, or in lieu thereof, the construction of an entirely new yard, as described in Section 3, would be necessary.

Spur tracks along the consolidated corridor between Third and Twelfth Streets, and easterly of Twelfth Street would also be adjusted to preserve rail service to existing shippers.

The right-of-way now occupied by Southern Pacific facilities in Commercial Street between Third and Eleventh Streets would be released for other uses, as described in Section 11.

CORRIDOR DESCRIPTION

This plan, as originally conceived in 1972, and as described in an earlier pamphlet, called for only two main line tracks in Silver Street. However, design criteria which have become available subsequently, indicate that two tracks would be inadequate. Therefore, the Silver Street plan as described in this report involves three parallel tracks. The outer two tracks would be the through eastbound and westbound main lines, and the center track would serve the dual functions of the easterly entrance lead and switching "lead" for the remodeled WP yard, and as a passing track.

The corridor to be utilized for the consolidated rail facilities would consist of the existing 80 foot-wide public right-of-way of Silver Street, most of which would be fenced and conveyed to the railroads for their exclusive use.

The space required for rail facilities in this corridor between Second and Twelfth Streets would be arranged as follows:

Corridor Strip and Typical Section	Width
North right-of-way fence to SP main line (westbound)	20 ft.*
SP main line to WP yard lead	20 ft.
WP yard lead to WP main line (eastbound)	20 ft.
WP main line to south right-of-way fence	20 ft.
	80 ft.

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*Distances measured between track centers

GRADE SEPARATIONS (See Exhibit 4-2)

The Silver Street plan would include two grade separations, which for preliminary study purposes have been tentatively located at Fifth Street (State Route 46) and at Eighth Street; closure of existing grade crossings at Seventh, Ninth and Tenth Streets; and installation of automatic crossing protective devices at Third, Fourth, Sixth and Eleventh Streets, which would remain as grade crossings. Thus, two grade separations, three closures, and four sets of automatic gates would replace the flashing lights and crossbucks at nine existing WP grade crossings.

The vehicular grade separations could either be underpasses or overheads, or an underpass at one site and an overhead at the other. The schematic plan depicted on Exhibit 4-1 assumes overhead structures. Should the Silver Street plan be selected, further design studies would be necessary to develop recommendations for the most appropriate type of separation -- whether overhead or underpass -- at each of these two sites.

Preliminary studies for underpasses, although not shown in this report, include the following features:

- Dual electrical pump installations would drain the underpasses. The relatively high water table in Elko and the close proximity to the Humboldt River would create difficult drainage problems, and the use of a reinforced concrete so-called "boat" section, to withstand hydrostatic pressures and resist uplift might be necessary to assure the underpasses would remain dry. There would also be hazard of some flooding of the underpasses in the event of heavy runoff in the local Elko watershed or from a possible overtopping of the levees of the Humboldt River. The approaches to the underpasses are in areas which have been subject to inundation in the past.
- A new diagonal north-south street would join the underpass on Eighth Street to existing Lamoille Road south of the Humboldt River.
- For either the underpass or overpass plans, the fronting property along one or both sides of Fifth Street and of Eighth Street would be acquired to accommodate the approach embankments or excavations. This would involve heavy damage to commercial properties along the Fifth Street area. Use of retaining walls in lieu of open cut would not materially reduce the property or severance along Fifth Street, but would avoid acquisition of some properties fronting on intersecting streets.

River Bridge

For either the underpass or overpass alternative in the Eighth-Ninth Street area, it has been assumed that a new vehicular bridge across the Humboldt would be required, because of profile, alignment, and structural considerations.

Twelfth Street Grade Separation (Alternate)

As an alternate to the Eighth Street grade separation over or under the tracks, mentioned above, a new north-south arterial could be constructed along the alignment of Twelfth Street extended, as shown on Exhibit 4-1. This arterial would involve a new bridge across the Humboldt River, with the new arterial connecting into the Lamoille Highway. A pedestrian bridge at Ninth Street would accommodate school children.

Grade Crossings to Remain and Improvements to Automatic Protection

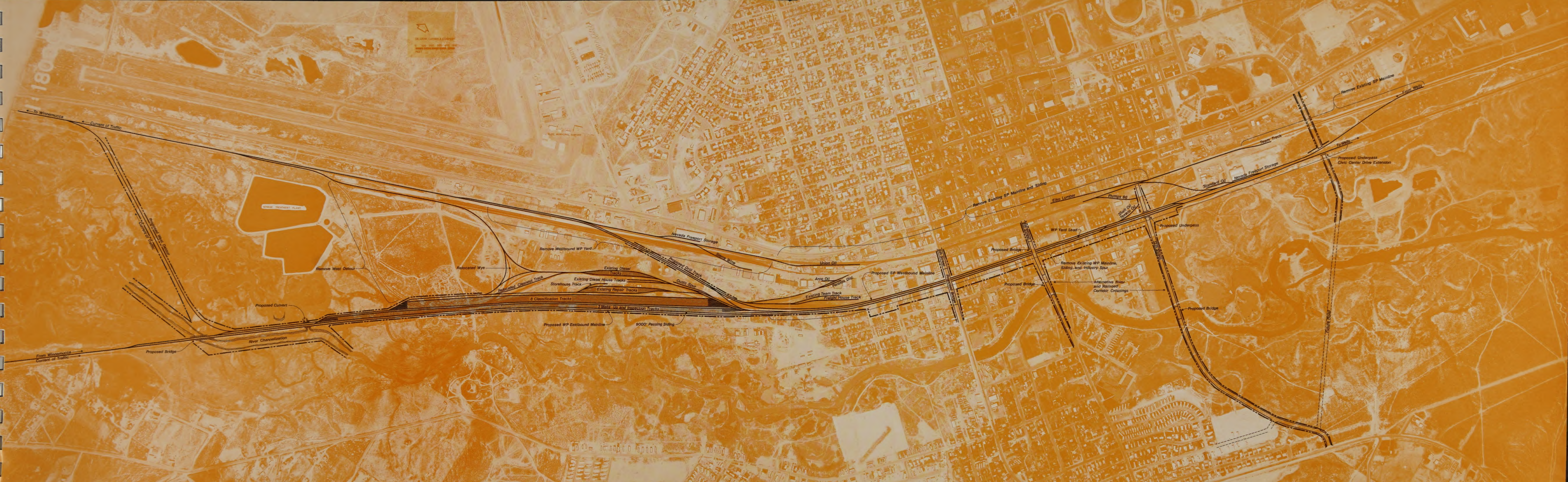
At the four remaining grade crossings across the consolidated railroad corridor -- Third, Fourth, Sixth and Eleventh Streets -- it is proposed that the existing flashing lights be replaced with Standard No. 9 automatic gates. These automatic gate installations would afford a high degree of protection against injuries and fatalities.

With the installation of automatic grade crossing protection along Silver Street, diesel locomotives probably could reduce the nuisance of sounding their air horns through Elko.

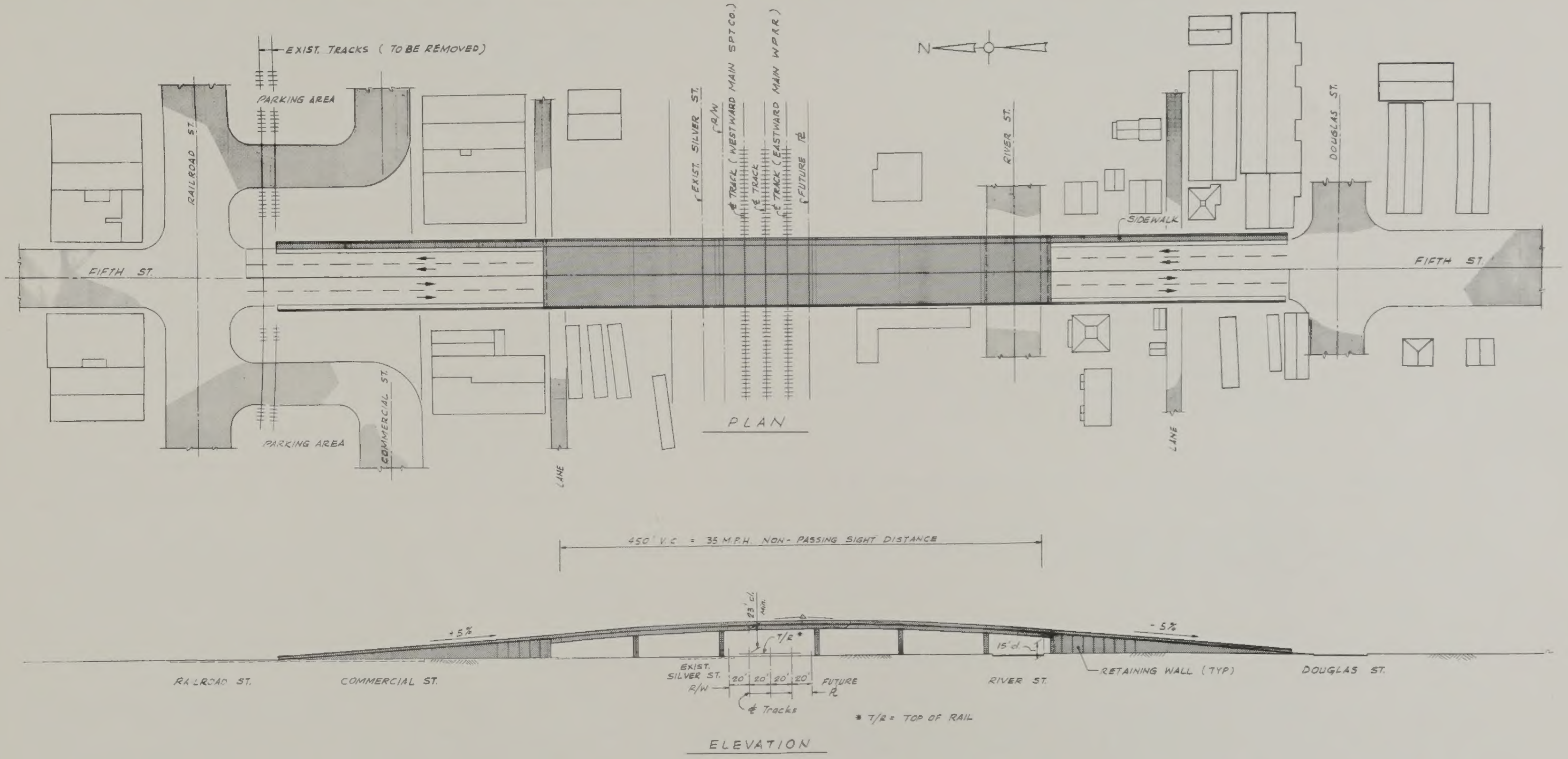
Although as noted above, it is proposed that the existing Silver Street grade crossings at Third, Fourth and Sixth Streets be allowed to remain, it is appropriate to offer some general comment as to how often they might actually be available for public vehicular traffic.

The center track, identified in the previous tabulation as the "WP yard lead track," could be almost continuously utilized by Western Pacific switch engines as a switching "tail," shuttling cars in and out of the east throat of the remodeled classification yard. Since the length of switching "lead" required for railroad classification operations is approximately 4,000 feet, this means that all of the grade crossings from Third to Eleventh Street, inclusive, would be subject to disruption by switch engines pulling and pushing cuts of cars. The frequency of blockage of grade crossings would be highest in the Third, Fourth and Sixth Street areas, and would decrease towards the east. Moreover, there would be frequent actuation of the automatic gates without the switch engine actually moving through the grade crossing. Thus, if Western Pacific transfers its eastbound classification work to Elko, any grade crossings remaining at Third Street or Fourth Street could become practically useless because of almost continuous blockage by switching movements, and a Sixth Street crossing would be of only limited value.

Therefore, if this plan were to be seriously considered, the need is clearly apparent for an additional railroad grade separation in the Third Street area; otherwise, the residential area south of the consolidated railroad corridor would be compelled to rely almost exclusively on the proposed Fifth Street Overhead to gain access to downtown. Unfortuately, however, there is no suitable site in the Third Street area for such a vehicular separation. Reconnaissance indicates that any such separation would ser-



4·1 Silver Street Alignment



4·2 Fifth Street Bridge and Overhead · Silver Street Alignment iously impair access to some of the community's major civic and commercial establishments, such as the Stockmen's Hotel and the Elko post office. Thus, this plan would tend to create more problems, for which no appropriate solution is available, in the Third Street area than it would cure.

Grade Crossing Closures

The WP grade crossings at Seventh, Ninth and Tenth Streets proposed to be closed were selected either because they do not extend across the Southern Pacific right-of-way, or because adequate north-south traffic circulation would be available at the two proposed grade separations and at the four remaining crossings at grade.

RECHANNELIZATION OF HUMBOLDT RIVER

Within downtown Elko the rail consolidation work is restricted to the narrow Silver Street corridor; rechannelization of the section of river between Sixth and Tenth Streets is not required.

However, the yard modifications and lengthening of classification tracks as described in Section 3, would necessitate construction of a flood overflow channel for the river south of the sewage treatment lagoons.

COMPARATIVE ADVANTAGES, DISADVANTAGES, AND TECHNICAL CONSIDERATIONS RELATING TO THE SILVER STREET PLAN

After detailed examination of this plan and development of cost estimates, the principal advantages and disadvantages of the Silver Street Plan can be identified and are tabulated below.

Advantages:

1. From the standpoint of initial capital cost, this plan would be approximately of the same order of magnitude as the North Bank Plan described in Section 5.

2. No increased travel distance for eastbound trains, and only a minor increase for westbound trains. There is only a minor increase in the total central angle of curvature for the railroads.

3. Several warehouses, the Nevada Power Company plant, and other major structures along the north side of Silver Street would constitute a limited and partially effective noise barrier, directing sound energy originating from trains upwards and away from residential areas.

4. Some but not all of the existing industries fronting along the north side of Silver Street could retain their present rail spur access.

5. No dislocation of the South Side Park.

6. No need to rechannelize the Humboldt River in the reach between Sixth and Tenth Streets. Both the north and south banks of the river would remain accessible to the public.

7. A review of utility maps reveals no unusual problems with respect to relocation of underground utilities.

Disadvantages:

1. In earlier discussions this plan found little support with the railroads or with community leaders as compared with the other relocation plans described in this report. Thus, it is questionable whether the Silver Street plan is acceptable to the railroads or to the public.

2. Since some grade crossings would remain, there is no positive assurance that the nuisance constituted by blowing of locomotive air horns would be eliminated.

3. The railroads would still be conducting their main line operations at grade immediately adjacent to the downtown business district.

4. The railroads would continue to constitute a barrier through the City and would still tend to divide established residential neighborhoods. Thus, the Silver Street relocation plan does not solve the grade crossing problem, does not accomplish the basic objectives of track consolidation, and does not eliminate all grade crossings and their associated hazards.

5. The portion of the community served by south Second, Third and Fourth Streets would continue to be isolated due to the expected continuous blockage of the Third and Fourth Street grade crossings by switch engines moving back and forth in the east throat area of the WP yard.

6. Due to the short distance available for approach ramps, it is impractical to construct vehicular separations under or over the railroad corridor at locations where they would best fit the street circulation system. Such depressed or elevated embankment approaches to grade separations would cross and intercept Douglas, River, Commercial and Railroad Streets, possibly making these streets discontinuous rather than remaining as east-west thoroughfares. Depressed approaches to underpasses at Fifth and Eighth Streets would encroach into the existing Southern Pacific right-of-way reservation between Commercial Street and Railroad Street, and would preclude the satisfactory development of this right-of-way for open space, for a civic plaza, or for other community uses.

In summary, after this plan had been more fully developed and evaluated, and after the effects of potential increased Western Pacific classification and switching operations became evident, the disadvantages and design deficiencies became more clearly apparent. Indeed, it now appears that the two railroads cannot be consolidated along Silver Street in an acceptable manner to solve the community problems in Elko, and that such a plan would be incompatible with Western Pacific's objective of increased switching activity. Therefore, for this plan to be given serious consideration, it would have to be evaluated in conjunction with the relocation of the Western Pacific yard to a new site east of Elko, as described in Section 9.

Table 4-1

PRELIMINARY COST ESTIMATE SILVER STREET PLAN

RAILROAD ROADBED PREPARATION	
Cleaning, earthwork, drainage collection lines, embankment stabilization	$ 62,000
TRACKWORK	
New main line construction, rework yard tracks, shoofly for new Humboldt River bridge, new and relocated turnouts, etc.	2,003,000
YARD LIGHTING	10,000
SURFACING OF INSPECTION ROADWAY	72,000
GRADE CROSSINGS	
Install No. 8 Flashing lights at Western Pacific yard entrance	25,000
Install four sets No. 9 automatic gates (triple track)	320,000
BRIDGES AND CULVERTS	
New Humboldt River Bridge	576,000
18th Street (Civic Center Drive Extension) Overcrossing	323,000
Culverts	225,000
RAILROAD ENGINEERING AND INSPECTION	50,000
SIGNALWORK AND COMMUNICATION LINES	150,000
RIVER RELOCATION	
Excavation	249,000
Riprap	142,000
GRADE SEPARATIONS AND HIGHWAY BRIDGES	
5th Street Separation	1,224,000
8th Street Separation (or 12th Street)	1,224,000
New 8th Street River Bridge	375,000
ROADWORK	
Earthwork, paving, drainage, curbs, gutters, sidewalks, utilities, lighting, landscaping, etc., associated with grade separation structures	$ 180,000
(For 12th Street alternative)	(223,000)
RIGHTS-OF-WAY	
Acquisition (with 8th Street Overcrossing)	$ 2,403,000
Acquisition (with 12th Street Underpass)	(2,412,000)
Relocation of residents and businesses (8th Street)	822,000
Relocation of residents and businesses (12th Street)	(740,000)
Negotiation, appraisal, title reports, legal costs, etc.	215,000
UTILITY RELOCATIONS	$ 25,000
DOWNTOWN RESTORATION	
Regrade and restore pavement at abandoned SPT Co. grade crossings	40,000
SUBTOTAL	
8th Street Alternative	$10,715,000
12th Street Alternative	(10,685,000)
APPURTENANCES @ 10% of Construction Items	$ 728,000
ENGINEERING AND CONTINGENCIES @ 20%	2,140,000
TOTAL COST	
8th Street Alternative	$13,583,000
12th Street Alternative	(13,553,000)

COMPARATIVE ENVIRONMENTAL ADVANTAGES AND DISADVANTAGES

Advantages

- The use of welded track will reduce the "clickety-clack" noise associated with trains passing over the existing bloted steel rails.
- Elimination of low speed limits in town removes need for acceleration, a major source of low frequency vibration.
- Allows for the potential redevelopment of the railroad commercial street corridor into a pleasing urban space. However, the approach ramps needed for the Eighth Street overcrossing will extend into the corridor area and thereby limiting its most potentially efficient utilization.
- 54 dwelling units will be freed from noise exposure in excess of 65 L_{dn} and 52 businesses will be freed from noise exposure in excess of 75 L_{dn}.

Disadvantages

- This alternative will preclude the implementation of the Elko Master Plan. The Eighth Street overpass will disrupt east-west circulation, which will require more circuitous routing for school and emergency vehicles. Silver Street itself will not be available for use as a major east-west collector, a function it serves in the master plan, and a function that will be essential for the efficient redevelopment of the area presently containing the WPRR yard.
- The alternative does not really resolve the problems which have been the impetus for the rail relocation study. Noise in the downtown area is reduced somewhat by the plan, but not to the same degree as in other alternatives. The visual effects from a high overpass on Eighth Street would be overpowering and out of scale with the surrounding residential structures. North-south traffic would not be entirely disrupted by occasional train blockage as is currently the case, but it would not be as convenient as the accessibility provided by other alternatives.

In summary, the Silver Street plan is only a partial solution to the railroad conflicts that plague Elko.

Section 5

North Bank Plan

Track Consolidation and Relocation of both Railroads along the North Bank of the Humboldt River

INTRODUCTION

This plan calls for an integrated corridor along the Humboldt River with the tracks of the two railroads relocated on the north bank of the river, sections of which would be rechanneled, and with a linear park and flood overflow area along the south bank. This corridor is now unsightly and blighted, containing automobile dismantling yards, gravel pits, substandard and deteriorated housing, and is subject to occasional flooding.

The proposed project, in brief, consists of:

1. Relocation of the main lines and certain auxiliary tracks of the Southern Pacific Transportation Company and The Western Pacific Railroad Company from their separate right-of-way through downtown Elko, onto a consolidated railroad corridor along the north bank of the Humboldt River.
2. Rechannelization of two short portions, each approximately 1,500 to 3,000 feet long, of the Humboldt River.
3. Two initial vehicular viaduct structures, to carry Fifth Street and Eight Street-Lamoille Road or Twelfth Street across the relocated railroads and over the relocated Humboldt River channel and overflow area.
4. An initial underpass structure to accommodate a future East Bypass street, to be located in the gravel pit area on the approximate southerly extension of Civic Center Drive.
5. Relocation and redevelopment of the South Side Park and creation of a linear recreational area along the south bank of the Humboldt River.
6. Reconstruction and realignment of portions of Western Pacific's Elko yard, or in lieu thereof, construction of a substitute yard about four miles east of town.

RIVER RECHANNELIZATION

The flood control channel for the river would follow the hydraulic design criteria of 7,000 cfs as described in Section 13. This plan would include a channel relocation between Sixth and Tenth Streets, eliminating the oxbow bend in the river.

The typical section for the revised river channel includes a defined river channel adjacent to the north bank, and a flood overflow area along the south bank of the river.

RAILROAD GRADE SEPARATIONS

This plan calls for three grade separations across the railroad barrier and spanning the river, as follows:

Fifth Street (State Route 46) Bridge and Overhead (See Exhibit 5-2)

This separation would be an elevated viaduct-type structure, some 400 feet long, spanning the railroad corridor, the Humboldt River, and its overflow area along the south bank.

The structure roadway would be about 60 feet wide, providing for two traffic lanes in each direction and a sidewalk along one side.

Eighth Street-Lamoille Road Bridge and Overhead (Alternate) (See Exhibit 5-3)

This separation plan (an alternative to the Twelfth Street Separation, below) would span the railroad corridor and the relocated Humboldt River on a new alignment connecting Eighth Street north of the tracks with existing Ninth Street south of the river.

Eighth Street, north of the river, was selected in preference to Ninth Street, because the former offers a longer continuous route through the northerly section of the City and is better adapted to the City's master plan for major thoroughfares.

Span lengths for this viaduct structure would be substantially similar to those for the Fifth Street Bridge and Overhead previously described. The roadway which would provide for two through traffic lanes plus a sidewalk-bike path.

Twelfth Street Underpass (Alternate)

This separation plan (an alternative crossing to the Eighth Street Bridge and Overhead described above) would be located on the southerly extension of Twelfth Street, pass under the railroads, span the river on a new vehicular bridge, skirt easterly of the South Side School, and connect into the Lamoille Highway, as shown on Exhibit 5-1.

East Bypass

In the easterly outskirts of the community the relocated railroads traverse a low overflow area of the Humboldt River. Grade considerations require the construction of embankments, averaging about ten feet high and about one-half mile long. An opening for a vehicular roadway and a bridge structure would be incorporated into this embankment on the southerly extension of Civic Center Drive. This bridge will initially provide vehicular access to an existing rock and gravel operation, and subsequently will be available for a new north-south thoroughfare, connecting the intersection of East Idaho Street at Civic Center Drive on the north with the Lamoille Highway on the south.

"Hot Hole" (West) Bypass

There has been discussion for many years of a possible future west bypass highway crossing the Humboldt River near the location of a former bridge and near the geothermal "Hot Hole" on Bullion Road. Such a crossing is not precluded by any of the track relocation or consolidation plans, but no special features need be incorporated in the initial track consolidation project to accommodate this possible future bypass route.

RAILROAD CORRIDOR AND TRACK REARRANGEMENTS

The number and configuration of railroad tracks in this relocation corridor would follow the criteria discussed in Section 3.

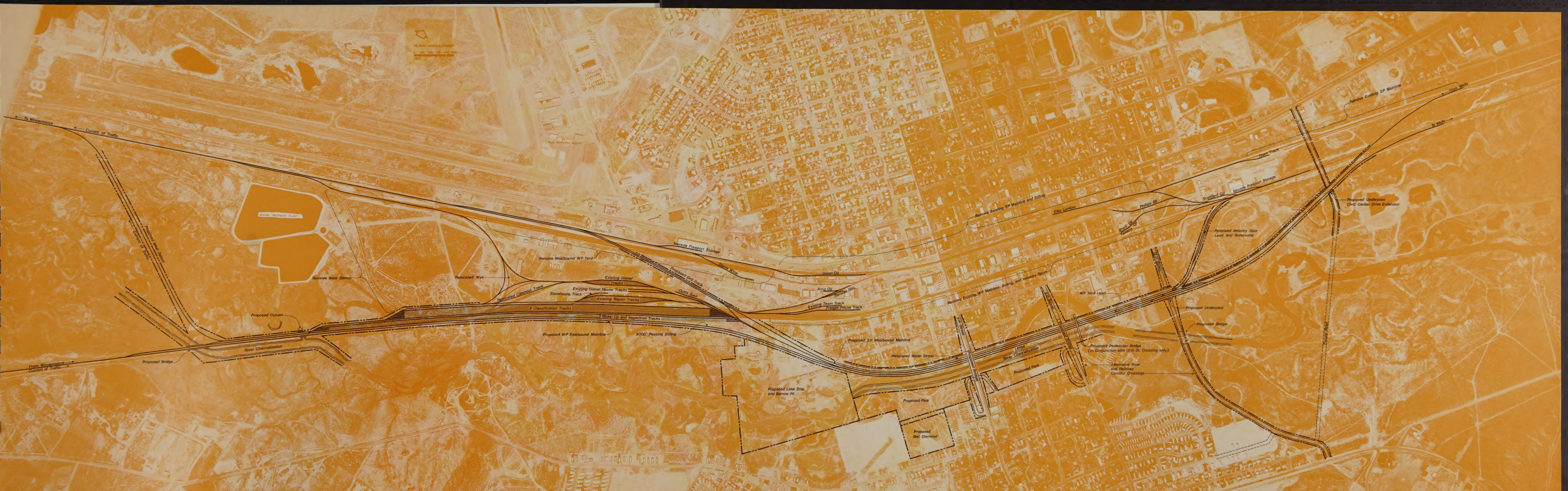
The total length of railroad relocation, measured from this point of intersection on the existing Southern Pacific main line at the west end of the City, to the point where the Southern Pacific returns to its existing alignment east of Elko, is 2.57 miles.

The railroads on the north bank of the river would be separated longitudinally from the channel by a maintenance roadway and levee, which could be used jointly by levee and railroad maintenance vehicles. The typical section is illustrated on Exhibit 5-4.

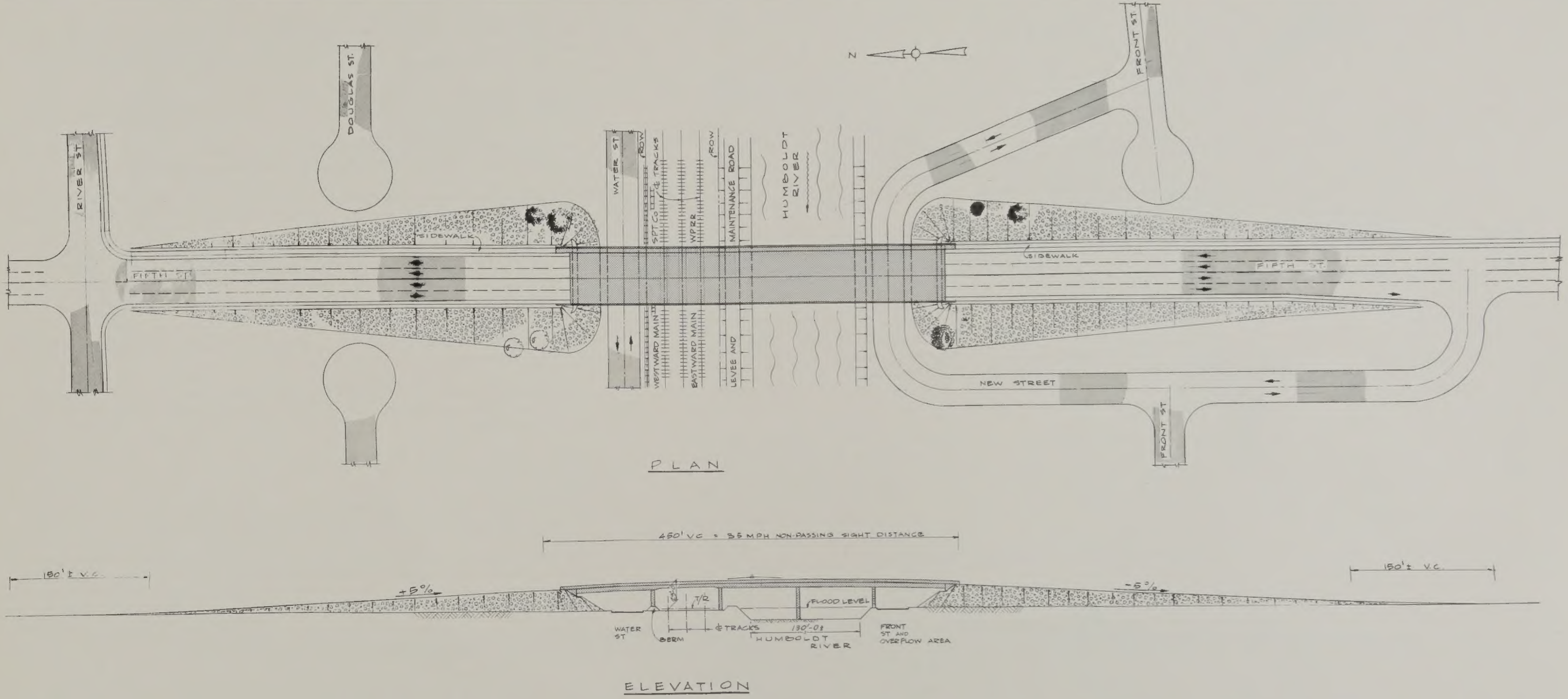
Access to the industries east of Elko would be provided by new spur track connections. Certain trackage is retained east of Elko to attract rail oriented industries.

All of the existing rail oriented industries west of Third Street and east of Eleventh Street would retain their present rail access, with certain tracks to be rearranged as required. Direct rail service to Bodily Furniture and Nevada Power Company would be discontinued. However, the total car movement to and from these two shippers totals less than 80 cars per year, or less than six percent of the total local rail business in Elko. It is anticipated that Bodily Furniture could be served by conveniently located public team tracks, and Nevada Power has previously indicated its willingness to relocate its pole unloading facility to a new location for more efficient truck and rail access.

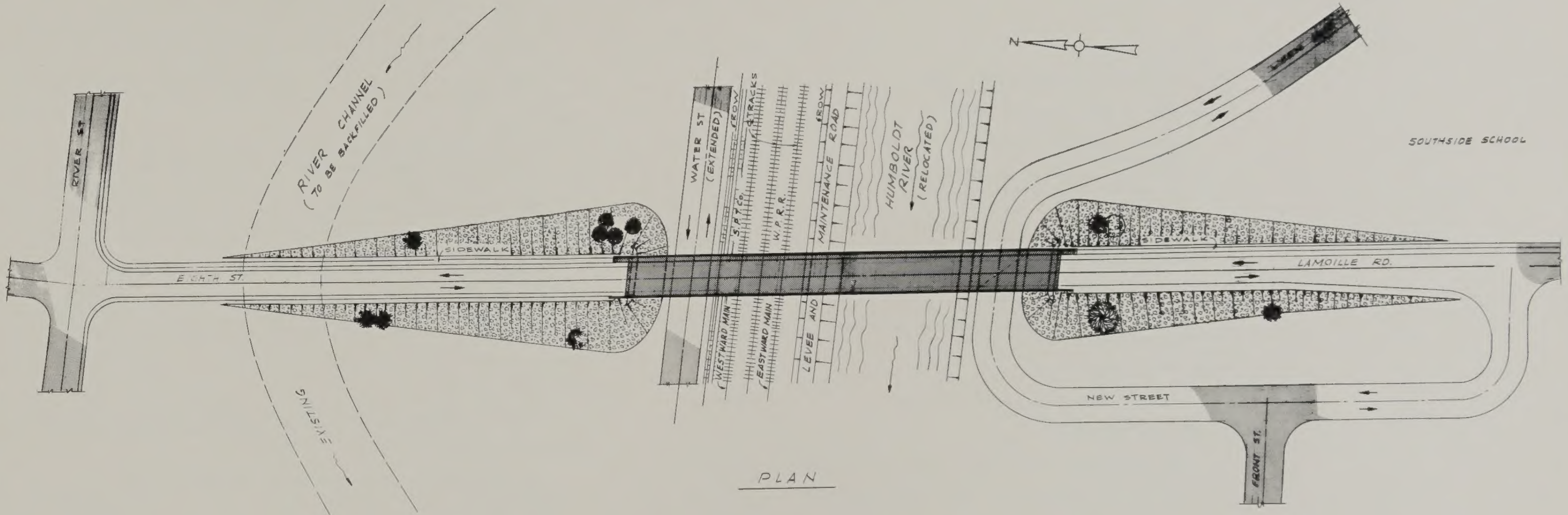
Existing spur tracks serving the Elko Lumber Company and the Builders' Mart would remain for an interim period. Based on experience in other similar communities it is anticipated that these shippers eventually would relocate to the outskirts of the community.



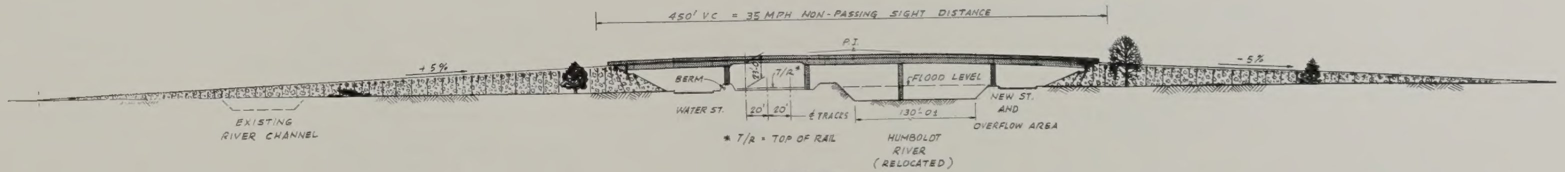
5·1 North Bank Alignment



5·2 Fifth Street Bridge and Overhead · North Bank Alignment



PLAN



ELEVATION

5·3 Eighth Street · Lamoille Road Bridge and Overhead · North Bank Alignment

1" = 40' scale 40 0 40 80 feet

PARK REDEVELOPMENT

The proposed track and channel realignment will occupy portions of the existing South Side Park. Present recreational activities in this park, and recommendations for their relocation at a new site, are discussed in Section 11. However, following completion of the track relocation project, the entire south bank of the river would be restricted to flood overflow, open space, and recreational uses. Flood control consideration would discourage the erection of major structures. Thus, this plan calls for a linear park along the riverfront which could become a visual asset to the community and benefit the neighboring residential areas. These improvements would replace the presently blighted area and auto junkyards along the south bank of the river. Railroad operations would be screened to some degree by trees and shrubs and by the northerly levee of the channel.

STREET MODIFICATIONS

A longitudinal frontage road following the northerly side of the railroad corridor (identified on the exhibits as "Water Street") is proposed to connect the severed ends of several north-south streets, and avoid the need for cul-de-sacs. The proposed continuous frontage road will improve traffic circulation through the neighborhood; will enhance fire, police, and emergency vehicle services; and will also serve as a buffer between the railroad corridor and adjacent private buildings.

On the south bank of the river grade considerations appear to preclude direct connections between Front Street and the southerly ends of the Fifth Street and the Eighth Street-Lamoille Overheads. Suitable one-quadrant interchanges and loop connections under the bridges offer a possible means to preserve the continuity of Front Street.

RIVER BANK ALTERNATIVE WITHOUT RIVER RECHANNELIZATION

A suggestion has been advanced that the north bank alternative be constructed without rechannelizing the Humboldt River to eliminate the oxbow bend, as previously described. The primary purpose of retaining the oxbow bend would be to avoid disturbance of the existing river channel and associated aquatic plant and animal communities. Such an alternative would necessitate construction of two additional railroad bridges across the river, in the vicinity of Sixth and Tenth Streets respectively. This plan was eliminated from consideration for several reasons, among which were:

- The two additional railroad bridges across the river would boost the overall north bank alternative cost by approximately $3 million.
- Maintenance of such bridges would impose a financial burden on the two railroads, and place them in a less secure position with respect to potential disruption of service from washout then with their present alignments.
- The presence of two additional bridges on the main stream of the river would subject the community to increased risk from flooding due to ice and debris jams catching on the substructure of the bridges.
- An isolated pocket of land, bounded by the river on the north and the railroad corridor on the south, would remain with only limited access.
- The plan would eliminate the flood protection benefits to downtown offered by the river rechannelization and levee strengthening.
- The plan would reduce the potential for rail spur service to possible future industrial development between Silver Street and the relocated main tracks.
- The environmental implications of providing two additional railroad bridges across the river and retaining the oxbow bend would be similar to that of the South Bank alternative.

COMPARATIVE ADVANTAGES, DISADVANTAGES, AND TECHNICAL CONSIDERATIONS RELATING TO THE NORTH BANK PLAN

After detailed examination of this plan and development of cost estimates, some principal technical advantages and disadvantages were identified and are tabulated below.

Advantages

- Involves approximately the same cost as the Silver Street plan, and is less expensive than the South Bank Plan.
- Is totally effective, in that it results in the complete elimination of all public main line railroad grade crossings in Elko. Only minor crossings of infrequently used industrial spur lines, or main line crossings restricted to the use of railroad employees would remain. The complete elimination of all main line grade crossings will obviate the need for locomotive horns to be sounded except for signaling purposes.
- The channelization of the Humboldt River, removal of existing constrictions, and the provision of a large waterway will create optimum hydraulic flow conditions and will afford the greatest flood control benefits.
- The channelization will create an opportunity to establish a linear park along the Humboldt River. In addition, a 15-20 acre recreation lake near the Humboldt can be formed from the excavation of fill re-

quired for the North Bank Alignment. The combination of recreation lake and linear park will substantially increase the outdoor recreation opportunities available within Elko and could provide a focus for commercial and residential developments in the future.

- Three north-south streets which now do not cross the Southern Pacific can be opened to improve the efficiency of Elko's street circulation network.

- By removing the main line WPRR and SPTCo. tracks well away from the Railroad-Commercial Street corridor, the opportunities for further commercial development of that corridor are substantially increased. The reduction in noise and vibration, aside from the physical removal of the tracks, will provide an environment conducive to more intensive urban development along the Railroad-Commercial Street corridor. This development in and surrounding the corridor will have the effect of shifting the downtown focus from the present strip development along U.S. Highway 40 to more concentrated development along Railroad and Commercial Streets. This concentration of development will provide the critical mass necessary for the efficient operation of hotel/gaming activities and will form the nucleus for a "dominant urban place" within Elko. The existence of such an urban place, symbolized at present by the Stockman's and Commerical Hotels, will add diversity to the cityscape, increase the number of tourists who "stop off" in Elko en route through Nevada, and provide residents with increased visual and experimental contrasts that will enrich the quality of life.

Disadvantages

- Disruption of South Side Park, necessitating substantial relocation.
- Requires rechannelization of a portion of the Humboldt River.
- Involves some adverse travel distance and increase of total central angle of curvature for both railroads.
- Loss of rail access for certain industries fronting on Silver Street.

Table 5-1

PRELIMINARY COST ESTIMATE NORTH BANK PLAN

RECONSTRUCT WP YARD IN PRESENT LOCATION	
Railroad roadbed preparation	$ 231,000
Trackwork	1,353,000
Land cost and right of way administration	814,000
New Humboldt River bridge	576,000
New bridge shoofly	30,000
Yard lighting	10,000
Surfacing inspection roadway	72,000
Grade crossing - No. 8 flashing lights	25,000
River relocation	390,000
MAINLINE RAILROAD ROADBED PREPARATION	
Cleaning, earthwork, drainage collection lines, embankment stabilization	100,000
MAINLINE TRACKWORK	
Includes industry track east end of town	1,273,000
BRIDGES AND CULVERTS	
18th Street (Civic Center Drive extension) Overcrossing	323,000
Culverts	102,000
12th Street Overcrossing (If 12th Street Alternative selected)	(547,000)
RAILROAD ENGINEERING AND INSPECTION	50,000
SIGNALWORK AND COMMUNICATION LINES	150,000
RIVER RELOCATION	307,000
GRADE SEPARATIONS AND HIGHWAY BRIDGES	
5th Street Separation	1,108,000
8th Street Separation	915,000
12th Street River Bridge (If 12th Street Alternative selected)	(354,000)
8th Street Pedestrian Bridge (If 12th Street Alternative selected)	(135,000)
ROADWORK	
Earthwork, paving, drainage, curbs, gutters, sidewalks, utilities, lighting, landscaping, etc., associated with grade separation structures	222,000
(For 12th Street Alternative)	(319,000)
RIGHTS OF WAY	
Acquisition (with 8th Street Overcrossing)	1,047,000
Acquisition (with 12th Street Underpass)	1,056,000
Relocation of residents and businesses (8th Street)	715,000
Relocation of residents and businesses (12th Street)	(631,000)
Negotiation, appraisal, title reports, legal costs, etc.	188,000
UTILITY RELOCATIONS	25,000
PARK REHABILITATION	75,000
Grading and development of borrow pit as recreational lake	100,000
DOWNTOWN RESTORATION	
Pave Silver Street, regrade and restore pavement at abandoned SPT Co. grade crossings	183,000
Grade and pave Water Street	293,000
SUBTOTAL	
8th Street Alternative	$ 10,677,000
12th Street Alternative	10,820,000
APPURTENANCES @ 10% of Construction Items	800,000
ENGINEERING AND CONTINGENCIES @ 20%	2,310,000
TOTAL COST USING RECONSTRUCTED PRESENT YARD	
8th Street Alternative	$ 13,787,000
12th Street Alternative	13,930,000
TOTAL COST USING RELOCATED YARD (see yard cost estimate Section 9)	
8th Street Alternative	$ 15,494,000
12th Street Alternative	15,637,000

Section 6

South Bank Plan

Track Consolidation and Relocation of both Railroads along the South Bank of the Humboldt River

INTRODUCTION

This plan is somewhat similar to the relocation along the north bank of the Humboldt River, as previously described, except that the two railroads would be relocated along the south bank of the river. The proposed location of the railroads would occupy portions of the existing South Side Park, a mobile home park, an automobile dismantling yard, and areas in which sand and gravel operations have been conducted.

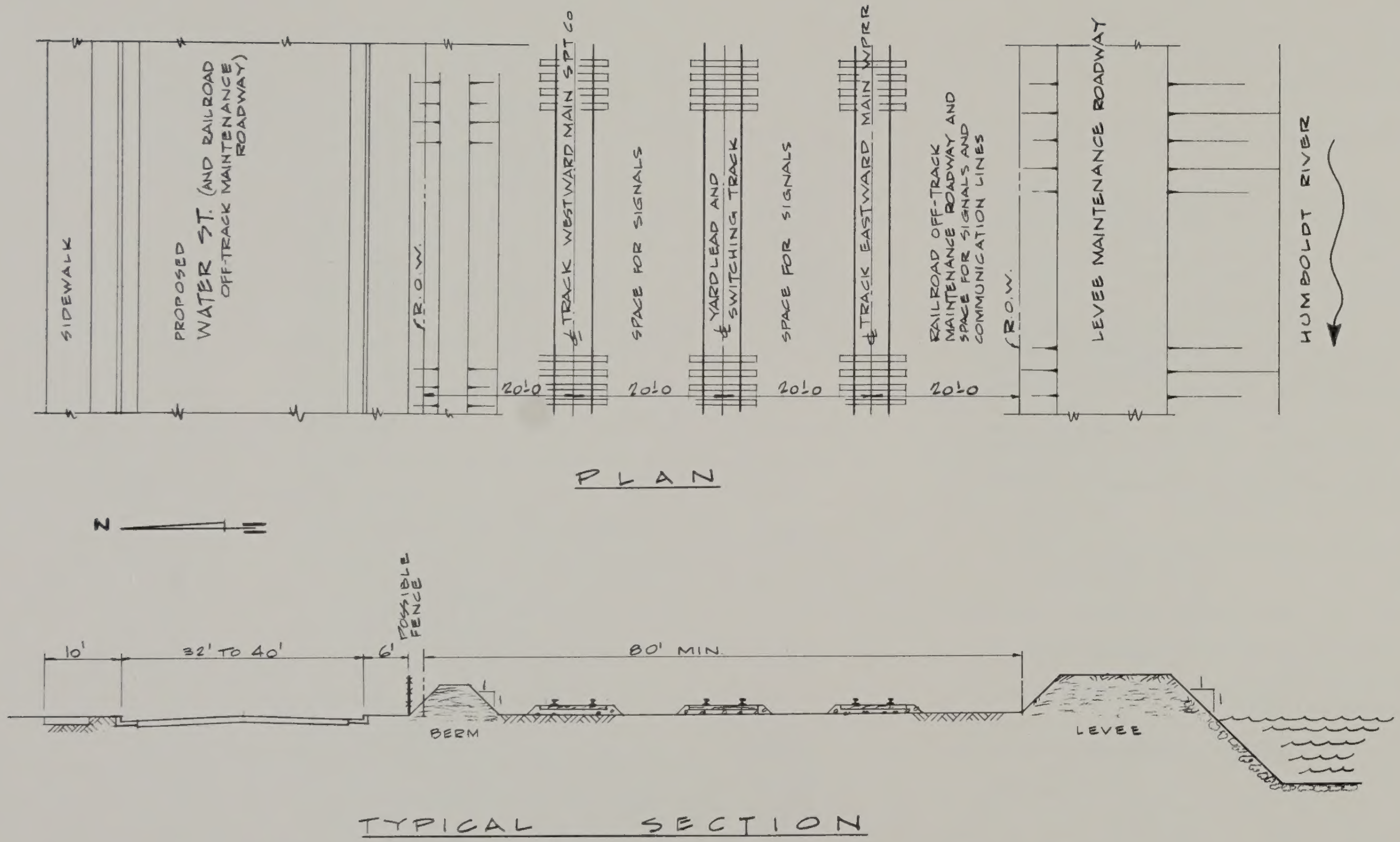
The proposed project, in brief, consists of:

- Relocation of the main lines and certain auxiliary tracks of the Southern Pacific Transportation Company and The Western Pacific Rail-Road Company from their existing locations through downtown Elko onto the consolidated railroad corridor along the south bank of the river.
- Construction of two initial vehicular viaduct structures to carry Fifth Street and either Eighth Street-Lamoille Road or Twelfth Street across the relocated railroads.
- Railroad grade separation under the consolidated railroad corridor at the eastern end of the project.
- Relocation of South Side Park.
- Reconstruction and realignment of portions of Western Pacific's Elko yard, or in lieu thereof, construction of a new substitute yard approximately three miles east of town.
- Construction of two three-track railroad bridges across the river.
- Rechannelization of the Humboldt River as necessary in connection with the proposed WP yard extensions, as described previously. No rechannelization of the river between Sixth and Tenth Streets need be undertaken as a part of this alternative.

RIVER RECHANNELIZATION

The flood control channel for the river would follow the hydraulic design criteria of 7,000 cfs as described in Section 13 . However, this plan would not include any channel relocation between Sixth and Tenth Streets, since there is no need to eliminate the oxbow bend in the river.

The typical section for the revised river channel includes a defined river channel, but there is no provision for a flood overflow area along either bank of the river in the downtown area.


SIDEWALK
PROPOSED WATER ST. (AND RAILROAD OFF-TRACK MAINTENANCE ROADWAY)
⅊ R.O.W.
℄ TRACK WESTWARD MAIN SPT CO
SPACE FOR SIGNALS
℄ YARDLEAD AND SWITCHING TRACK
SPACE FOR SIGNALS
℄ TRACK EASTWARD MAIN WPRR
RAILROAD OFF-TRACK MAINTENANCE ROADWAY AND SPACE FOR SIGNALS AND COMMUNICATION LINES
⅊ R.O.W.
LEVEE MAINTENANCE ROADWAY
HUMBOLDT RIVER
20'-0
20'-0
20'-0
20'-0
PLAN
N
POSSIBLE FENCE
10'
32' TO 40'
6'
80' MIN.
1
1
BERM
1
1
LEVEE
TYPICAL SECTION

5·4 Typical Section · Relocated Railroads along Bank of the Humboldt River

RAILROAD GRADE SEPARATIONS

This plan calls for three grade separations across the railroad barrier and spanning the river, as follows:

Fifth Street (State Route 46) Bridge and Overhead

This separation would be an elevated viaduct-type structure, some 400 feet long, spanning the Humboldt River and the railroad corridor.

The structure roadway would be about 60 feet wide, providing for two traffic lanes in each direction and a sidewalk along one side. It should be noted that this bridge does not connect to Front Street.

Eighth Street-Lamoille Road Overhead (Alternate)

This separation plan (an alternative to the Twelfth Street Separation, below) would span the railroad corridor with a new bridge across the Humboldt River on a new alignment connecting Eighth Street north of the tracks with existing Lamoille Road south of the river.

Eighth Street, north of the river, was selected in preference to Ninth Street, because the former offers a longer continuous route through the northerly section of the City and is better adapted to the City's master plan for major thoroughfares.

Twelfth Street Underpass (Alternate)

This separation plan (an alternative crossing to the Eighth Street-Lamoille Bridge described above) would be located on the southerly extension of Twelfth Street, pass under the railroads, span the river on a new vehicular bridge, skirt easterly of the South Side School, and connect into the Lamoille Highway, as shown on Exhibit 6-1.

East Bypass

In the easterly outskirts of the community the relocated railroads traverse a low overflow area of the Humboldt River. Grade considerations require the construction of embankments, averaging about ten feet high and about one-half mile long. An opening for a vehicular roadway and a bridge structure would be incorporated into this embankment on the southerly extension of Civic Center Drive. This bridge will initially provide vehicular access to an existing rock and gravel operation, and subsequently will be available for a new north-south thoroughfare, connecting the intersection of East Idaho Street at Civic Center Drive on the north with the Lamoille Highway on the south.

"Hot Hole" (West) Bypass

There has been discussion for many years of a possible future west bypass highway crossing the Humboldt River near the location of a former bridge and near the geothermal "Hot Hole" on Bullion Road. Such a crossing is not precluded by any of the track relocation or consolidation plans, but no special features need be incorporated in the initial track consolidation project to accommodate this possible future bypass route.

RAILROAD CORRIDOR AND TRACK REARRANGEMENTS

The number and configuration of railroad tracks in this relocation corridor would follow the criteria discussed in Section 3. Other details of the track relocation corridor would be substantially similar to those described for the north bank plan, as described in Section 5.

PARK REDEVELOPMENT

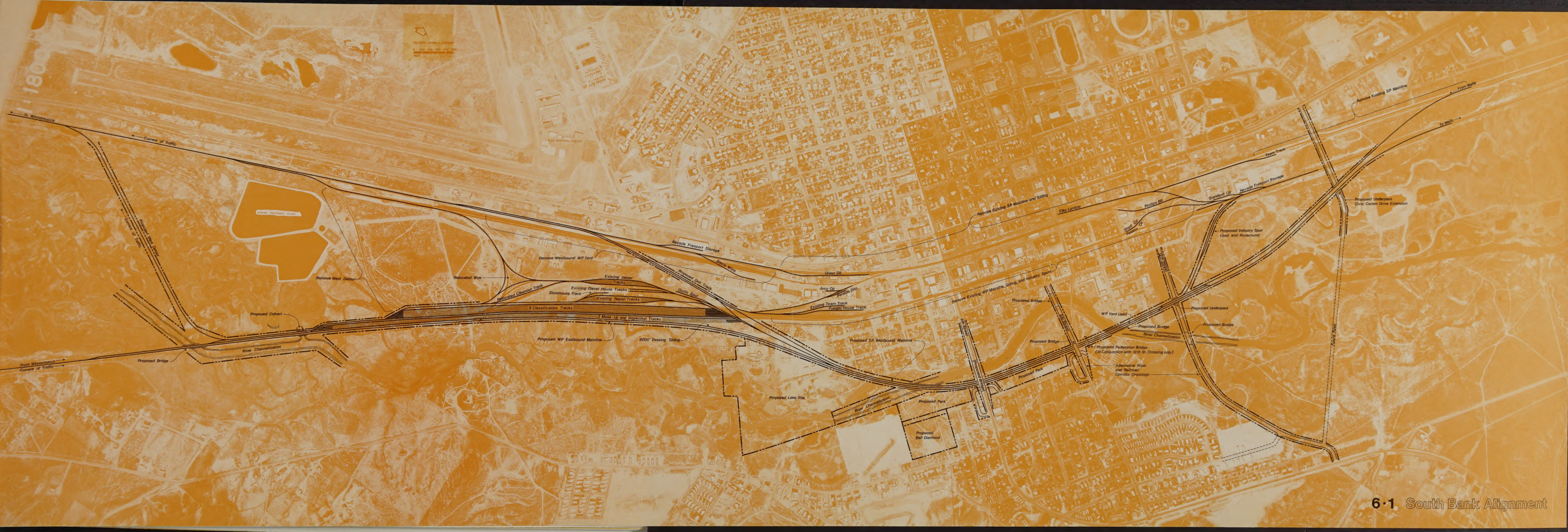
This proposed corridor would traverse major portions of the South Side Park. Relocation of major areas of this park and the recreational facilities contained therein to a new site and replacement with equivalent facilities would be required. Details of the proposed rearrangement of recreational facilities are set forth in Section 11.

COMPARATIVE ADVANTAGES, DISADVANTAGES, AND TECHNICAL CONSIDERATIONS RELATING TO THE SOUTH BANK PLAN

Advantages

After detailed examination of this plan and development of cost estimates, the principal technical advantages and disadvantages were identified and are tabulated below:

- With the removal of grade crossings along Commercial, Railroad and Silver Streets, downtown traffic circulation would greatly improve.
- It is totally effective, in that it results in the complete elimination of all public main line railroad grade crossings in Elko. Only minor crossings of infrequently used industrial spur lines, or main line crossings restricted to the use of railroad employees, would remain.
- The complete elimination of grade crossings will obviate the need for locomotive horns to be sounded except for signaling purposes.
- The railroad embankment along the south bank of the river would function as a strong protective levee, thus offering some improved flood



6·1 South Bank Alignment

protection to low-lying residential areas south of the river.

- The same opportunities for the development of the Railroad/Commercial Street Corridor, as described in Section 5 (advantages of the North Bank Plan), will also result from the South Bank Alternative.
- Rechannelization of the Humboldt River from Sixth to Tenth Streets and associated disruption of aquatic plant and animal life would be avoided.

Disadvantages

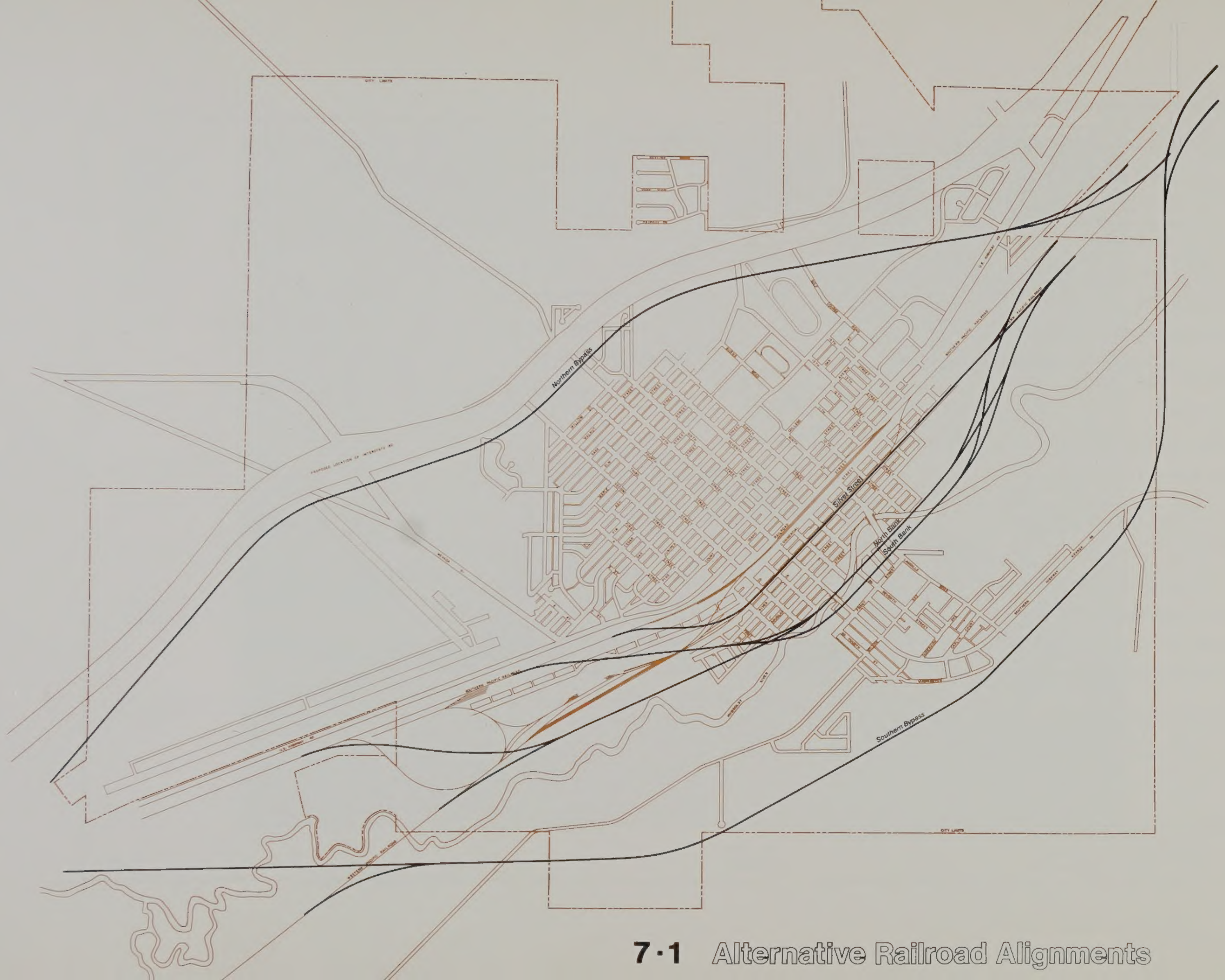
- Two long railroad bridges across the Humboldt River are required, in addition to any bridges necessitated by the other plans. These two additional railroad bridges very significantly increase the overall cost of this plan. They also could contribute to flooding problems for areas north of the river because of accumulations of ice or debris which could pile up against the piers.
- Severe disruption to the South Side Park, necessitating complete relocation of the park.
- No provision for a supplemental flood overflow area.
- Involves some adverse travel distance and increase in total central angle of curvature for both railroads.
- Loss of direct rail access for certain industries fronting on Silver Street.
- A linear park and recreation lake, as described in Section 5 (advantages of the North Bank plan) could also be developed with the South Bank plan, but the usable recreation area available for the linear park will be substantially decreased. In this alternative the right-of-way will bisect the land to be used for the park instead of lying to one side. The land on either side of the right-of-way, therefore, will have considerably less utility for recreation activities. In addition, the South Bank plan will result in a loss of visual connection between the proposed linear park and the Humboldt River.
- Involves serious dislocation of the street and traffic circulation network south of the river, because of the technical grade problems involving the south approaches to the proposed bridges across the river and rail corridor and the loss of Front Street. In the opinion of the Superintendent of the Elko County School District, this plan would have adverse effects on the South Side School because of traffic dislocation. It is impractical to connect the southerly approaches of the Fifth Street and Eighth Street grade separations to Front Street. Thus. the District is apprehensive that the changes in traffic patterns would greatly increase the number of vehicles passing in front of the school.

ELKO DRUGS
BUDDY'S BEEF
ELKO DRUG CO.
9182
SP
SOUTHERN PACIFIC

Table 6-1

PRELIMINARY COST ESTIMATE SOUTH BANK PLAN

RECONSTRUCT WP YARD IN PRESENT LOCATION	
Railroad roadbed preparation	$ 231,000
Trackwork	1,353,000
Land cost and right of way administration	814,000
New Humboldt River bridge	576,000
New bridge shoofly	30,000
Yard lighting	10,000
Surfacing inspection roadway	72,000
Grade crossing - No. 8 flashing light	25,000
River relocation	390,000
MAINLINE RAILROAD ROADBED PREPARATION	
Cleaning, earthwork, drainage collection lines, embankment stabilization	100,000
MAINLINE TRACKWORK	
Includes industry track east end of town	1,273,000
BRIDGES AND CULVERTS	
18th Street (Civic Center Drive extension) Overcrossing	323,000
Two Main Line River Bridges	3,192,000
Culverts	102,000
12th Street Overcrossing (If 12th Street selected)	(547,000)
RAILROAD ENGINEERING AND INSPECTION	50,000
SIGNALWORK AND COMMUNICATION LINES	150,000
RIVER RELOCATION	122,000
GRADE SEPARATIONS AND HIGHWAY BRIDGES	
5th Street Separation	1,108,000
8th Street Separation	749,000
12th Street River Bridge (If 12th Street selected)	(354,000)
8th Street Pedestrian Bridge (If 12th Street Selected)	(45,000)
ROADWORK	
Earthwork, paving, drainage, curbs, gutters, sidewalks, utilities, lighting, landscaping, etc., associated with grade separation structures	222,000
(For 12th Street Alternative)	(319,000)
RIGHTS OF WAY	
Acquisition (with 8th Street Overcrossing)	1,991,000
Acquisition (with 12th Street Underpass)	(2,000,000)
Relocation of residents and businesses (8th Street)	631,000
Relocation of residents and businesses (12th Street)	(613,000)
Negotiation, appraisal, title reports, legal costs, etc.	163,000
UTILITY RELOCATIONS	25,000
PARK REHABILITATION	75,000
Grading and development of borrow pit as recreational lake	100,000
DOWNTOWN RESTORATION	
Pave Silver Street, regrade and restore pavement at abandoned SPT Co. grade crossings	183,000
SUBTOTAL	
8th Street Alternative	$ 14,345,000
12th Street Alternative	14,060,000
APPURTENANCES @ 10% of Construction Items	1,050,000
ENGINEERING AND CONTINGENCIES @ 20%	2,830,000
TOTAL COST USING RECONSTRUCTED PRESENT YARD	
8th Street Alternative	$ 18,225,000
12th Street Alternative	17,940,000
TOTAL COST USING RELOCATED YARD (See yard cost estimate Section 9)	
8th Street Alternative	$ 19,932,000
12th Street Alternative	19,647,000



7·1 Alternative Railroad Alignments

Section 7

Other Alternative Railroad Relocation or Grade Separation Plans

Four other alternative railroad relocation and/or separation plans were identified, but were not recommended for detailed evaluation because of various technical or railroad operational inadequacies, or because of economic considerations. All of the plans have a common feature, namely, removal of the main line Southern Pacific tracks from Railroad and Commercial Streets through downtown Elko. (See Exhibit 7-1.)

NORTHERN BYPASS

Relocation following Proposed Interstate 80 around North Limits of Elko

Both railroads would skirt Elko to the north by following the southerly side of the proposed alignment for the I-80 Bypass. Thus, this plan would consolidate the new freeway and the tracks of the two railroads within the same transportation corridor. Several vehicular structures -- to carry US 40 East, US 40 West, State Route 51 (Mountain City Highway), and perhaps other local roads -- over the consolidated rail corridor would be necessary.

Some of the problems which make this plan technically or economically unattractive are:

1. Deep cuts: The terrain rises quite steeply to the north of the City. The railroad ruling grade of 0.4 percent maximum would necessitate cuts more than 120 feet deep. The resulting excavation would involve over 5.5 million cu. yds. Such a large volume adds a substantial amount to the cost and creates difficult disposal problems.

2. Unsightly: The excavation would be along the high ground to the north of town where it would be highly visible from the surroundings. The 5.5 million cu. yds. of excavation mentioned above is based on side slopes of 1½ to 1, which are too steep to plant and landscape effectively. The large volume of excavation would be difficult to dispose of in a manner which would not be adverse to the visual landscape.

3. Potential groundwater problems: The deep cuts could well intercept important aquifers and thereby could disturb significant underground water resources.

4. Complicate access to I-80: Although the railroads would be adjacent to I-80, they would probably be 50 or more feet lower in elevation. All off and on-ramps would have to pass over the railroad on high, long, expensive structures.

5. Require construction of a new railroad yard: This plan would separate Western Pacific from its Elko yard. Since the operation of trains into a stub-end yard would be inefficient and impractical, an entirely new substitute yard about four miles east of Elko, as described in Sections 9 and 27, would be required, together with relocation or abandonment of all existing facilities.

6. Displace important community activities: Because of the depth of cuts, the required railroad right-of-way would be 400 feet wide in some areas. It would eliminate some prime residential property as well as taking property from the U.S. District BLM office, the Nevada Highway Department District yards, the local fair grounds, the Elko Indian Colony, the new Northside Grammar School, and portions of the Elko Community College campus.

7. Potential alkali problems: The large excavations would expose significant areas of alkali-laden soils to leaching. Runoff from these large exposed slopes would temporarily increase the alkali content of the Humboldt River, although not to such an extent as to make the water unfit for downstream users. Lime treatment to neutralize the effects of the alkali and to help stabilize the slopes would be required.

8. Potential conflict with airport expansion: Possibly create problems for or preclude the opportunity of expansion and runway lengthening for the Elko Municipal Airport. Preliminary studies for such expansion are now in progress, although specific recommendations are not yet available.

9. Increase railroad operation costs: Significantly increase operating mileage and travel distances for main line railroad operations.

10. Excessive cost: The estimated construction cost of $17,500,000 does not include any allowance for the construction of a new railroad yard or for increases in cost for the construction of I-80 caused by the proximity of the railroad.

Because of the several physical and environmental disadvantages and the excessive cost, as compared with other more promising plans, further detailed study and evaluation of the Northern Bypass plan was not considered warranted.

TRACK CONSOLIDATION AND ELEVATION ALONG SILVER STREET

There are several possible variations of this plan, which in essence would consist of some combination of elevated reinforced concrete viaduct and earth embankments about 20 feet high to carry a double or triple-track SP-WP line over all principal north-south thoroughfares. Under one alternative, an elevated viaduct would be built in Silver Street. Under another variation, an embankment paralleling the south side of Silver Street would carry the tracks of both railroads. The several north-south streets would pass under the viaduct or through the embankment, allowing unimpeded vehicular traffic circulation between the north and south halves of the City and eliminating all main line grade crossings. A similar grade separation project was completed about 15 years ago through Fort Wayne, Indiana.

The structure would allow 15 feet vertical clearance for all streets crossing under it. The top of rail would be approximately 20 feet above the existing elevation of Silver Street. The fully elevated section would extend from Third Street to Tenth Street. The approach tracks would have a maximum grade of 0.4 percent, and would be located on structure or on earth fill.

For the several considerations listed below, the track elevation plan was eliminated from consideration:

- The approach embankments at the east end would extend for a distance of about 3,000 feet. However, the major technical problem is at the west end, where grade conditions make it difficult if not impossible to maintain access to the east throat of the WP yard.
- The existing WP westbound yard would have to be relocated as described in Section 4. Even if the WP yard was relocated east of the City, it would still be necessary to retain certain at-grade track for connections to industry sidings which would remain in service.
- This plan offers few advantages due to the cost of replacement of a substantial portion or all of the Western Pacific yard, the high cost of right-of-way along Silver Street, and the need to eliminate close-in industry spur tracks as the result of conflict with embankment slopes.
- An elevated embankment could be criticized as a wall, tending to divide instead of unify the City.
- The elevated viaduct would appear to be substantially more costly than other more promising plans and would be considered to be unsightly.
- The track elevation plan is the least desirable from the standpoint of attempting to minimize noise propagation from diesel locomotives, since noise would fan out over a wider area.

TRACK CONSOLIDATION AND DEPRESSION ALONG SILVER STREET

The tracks of the Western Pacific and Southern Pacific could be depressed in a trench extending through downtown Elko along Silver Street, with several north-south thoroughfares, such as Fourth, Fifth, Sixth, and Eighth Streets, carried over the top of the depressed trainway.

This plan also offers several variations, including:

1. Full depression in cut, with vertical reinforced concrete retaining walls on either side. Such a plan would be similar to the trainway which carries the Southern Pacific and Texas & Pacific through downtown El Paso, Texas, constructed shortly after World War II.
2. Full depression in open cut, that is, using slopes instead of retaining walls.

3. Full depression in a closed subway box-type reinforced concrete structure.

4. Partial depression, with the several local north-south streets "humped" to cross over the railroad trainway.

Description

Both main line tracks would be relocated in a depressed section along Silver Street. The several north-south streets would cross over the tranway at their existing grade. The depressed trainway would be approximately 50 feet wide.

Vertical clearance for most western grade separations is 23 feet 0 inches. However, to provide for possible future electrification, a vertical clearance of 25 feet above top of rail is required for preliminary analysis.

Since various utility lines would be carried in the decks of the several bridges spanning the depressed trainway, a structure depth of about five feet may be assumed, which would place the top of rail some 30 feet below the cross-street structures.

The fully depressed section would extend from Fifth Street to Eighth Street. The approach tracks would have a maximum grade of 0.4 percent, and would have retaining walls or open cut, depending on depth and value of adjacent property. One-way vehicular roadways parallel to the depressed trainway would provide access to properties fronting on Silver Street. If desired to maintain existing industrial spurs in service, an at-grade spur line could be constructed in one of the frontage roads along Silver Street.

Short street overpasses would be located at Fifth, Sixth, Seventh, and Eighth Streets. Pedestrian crossings or additional street crossings would be constructed at additional cost.

Rechannelization of the Humboldt River is not proposed under this plan.

Engineering Evaluation of Depressed Trainway

The technical engineering problems associated with the depressed trainway include:

- The relatively high ground water table is approximately ten feet below present surface. Serious problems would be encountered in attempting to keep a depressed trainway dry. The invert of the trainway would be below the elevation of the river channel. An expensive pumping installation would be mandatory.

- Track profile problems at both the east and west ends of the depressed trench. As explained previously, grades not exceeding 0.4 percent are required for main line track operations. Therefore, approximately 6,000 feet is needed at the west end of the trainway to ascend to existing grade from the low point of the depressed trainway. This would leave Western Pacific separated from its yard, creating an inefficient and unworkable stub-end yard; it is entirely impractical for the tracks to regain elevation in sufficient distance to connect to the present east "throat" of the yard. At the east end of the City, the existing ascending railroad grade rises so rapidly that a continuation of some 10,000 to 12,000 linear feet of cut to the east would be required to "catch" the existing grade.

- The depressed trainway would constitute an almost impassable barrier to existing and proposed storm drainage channels and storm sewer lines. These channels drain the local Elko watershed and have been the cause of recurrent flooding, as described in Section 13.

- Excessive cost, probably on the order of $20 million or more.

SOUTHERN BYPASS

This plan would relocate both of the railroads around the southerly portion of Elko, skirting the residential areas south of the Humboldt River. The alignment would cross the Humboldt River about a mile southwest of Elko, follow the base of the hills south of town, and thence recross the river to rejoin the existing alignment about a mile northeast of Elko. This plan would include two railroad bridges across the Humboldt River, a vehicular overpass near the "Hot Hole," a grade separation for State Route 46, and several large drainage culverts.

The Southern Bypass route possesses many of the same disadvantages as the Northern Bypass, although to a lesser degree. Among the basic features which do not make this plan technically or economically attractive are:

- Excessive cost: Although the alignment proposed is along the base of the hills, to provide an acceptable alignment and to avoid as much developed property as possible, some cuts having a depth of over 110 feet, involving approximately 2.25 million cu. yds. of excavation, would be required.

- Unsightly: Several of the excavation or cut slopes would be exposed, would be visible from surrounding residential areas, would be difficult to landscape, and would not present an attractive appearance.

- Require construction of a new railroad yard: This plan would separate Western Pacific from its existing Elko yard. Since the operation of main line trains into a stub-end yard would be inefficient and impractical, construction of an entirely new yard at the alternative location (discussed in Section 9) would be essential.

- The depth of cuts would require the acquisition of right-of-way 400 feet wide in some areas. Although one of the objectives of a Southern Bypass would be to avoid improved parcels of property, design studies indicate that several permanent or mobile homes lie in the path of the Southern Bypass.
- Significantly increase operating train mileage and travel distances for main line railroad operations, to the extent that the adverse economic
- Areas which are presently remote from the railroad would be exposed to railroad noise.
- The railroad corridor would form a formidable barrier to further development in southeast Elko.

Section 8

"No Project" Alternative

This alternative assumes that the tracks would not be consolidated, and that each railroad would remain on its present separate alignment through Elko. However, it must be recognized that static conditions can not exist indefinitely in an ever-changing world, and certain minimum inescapable capital expenditures and improvements will inevitably be required over the next few years, as outlined below:

Install Automatic Gates at Existing Grade Crossings

The present No. 8 flashing light protective devices at the several grade crossings in Elko are inadequate in light of the existing accident exposure and experience. A multi-million dollar program of federal aid was recently enacted by the U.S. Congress to upgrade automatic protection at thousands of grade crossings throughout the United States. Southern Pacific itself has urged replacement of the existing flashing lights in Elko with Standard No. 9 automatic gate installations equipped with grade crossing predictors. Therefore, it may be assumed that such automatic gates would be installed at approximately twelve grade crossings, with the remainder of the grade crossings to be closed.

Replacement of Existing Ninth Street Vehicular Bridge

This antiquated steel truss bridge across the Humboldt River is dangerously narrow and structurally inadequate. Its replacement within the next ten or 15 years could be expected to be undertaken as a conventional municipal bridge renewal project.

Extension of the Western Pacific Yard, or Passing Track

As discussed in Section 3, Western Pacific has initiated a long range program of lengthening all of its passing sidings across Nevada to approximately 6,700 feet, with the ultimate objective of lengthening to 9,000 feet. The 4,000 foot sidings in Elko are now among the few remaining short sidings on the railroad. In the ordinary course of budgeting for railroad capital improvements, it would be reasonable to expect these sidings at Elko to be lengthened.

Westbound Yard Extension

The inspection tracks in the WP yard are also too short for maximum length trains. Thus some lengthening of these tracks in this yard would also eventually be required.

Strengthen Levee System

The present levees along the banks of the Humboldt River were hastily constructed during World War II and do not meet current standards for flood protection works. Strengthening of these levees at some future date is expected to be required, although no cost has been assigned.

Off-Street Parking Lots

If the tracks are not removed from the central portion of the City, the acquisition of selected lots and their development for surface off-street parking is considered as a strong probability as the City grows.

Table 8-1

PRELIMINARY COST ESTIMATE

GRADE CROSSINGS	
Install 12 sets of Standard No. 9 automatic gates and flashing lights, with grade crossing predictors, at $35,000 per installation.	$420,000
Close and barricade five grade crossings, at $5,000 per crossing.	25,000
BRIDGE	
Construct new vehicular bridge at Eighth or Ninth Street (10 or 15 years hence).	375,000
TRACKWORK	
Lengthen Western Pacific eastbound and westbound passing tracks, including railroad bridge for second track.	(Track) 167,000 (Bridges) 160,000
OFF-STREET PARKING LOTS	170,000
SUBTOTAL	1,317,000
ENGINEERING AND CONTINGENCIES @ 20%	263,000
TOTAL COST	$1,580,000

Section 9

Yard Removal and Construction of New Yard in Alternate Location near Elko

INTRODUCTION

Due to the problems caused by required remodeling of an existing yard to conform to an alignment revision, a project designed to eliminate at-grade railroad crossings should consider either yard remodeling or possible yard relocation.

The activities performed in the yard are critical to efficient railroad operations, thereby making the yard layout as important to the railroads as elimination of at-grade crossings is to the traveling public.

The present yard is situated on the westerly edge of Elko and is a continuous source of noise, air pollution and possible contamination of the ground water system through spillage of fuel and car cleaning wastes. The present yard hampers community development to the west and southwesterly and is an objectionable item in the City Master Plan. The bumping of cars, engine noises and yard whistles can be heard throughout the City during all hours of day or night.

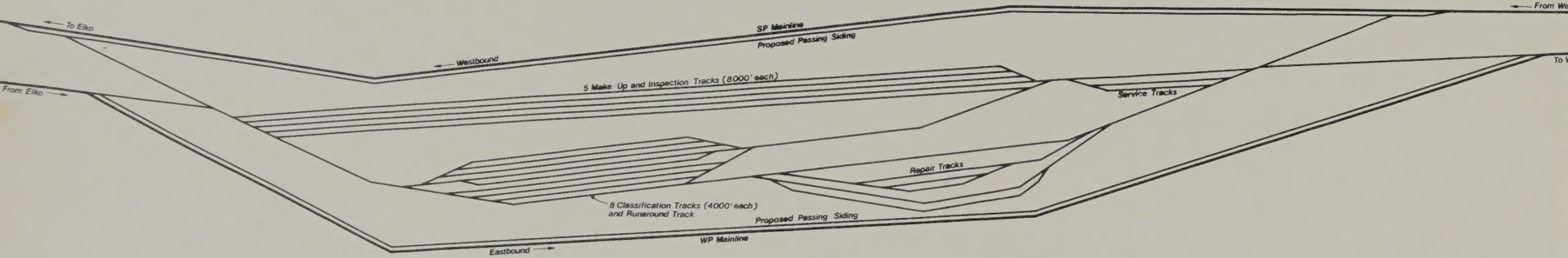
Treatment of this operation should not be handled lightly, or as a sidelight to the project. It is for this reason, as well as for the specific benefits involved in the Elko project, that possible yard relocation is being considered as a viable alternative.

As an alternative to remodeling or extending the present yard to meet Western Pacific's present and future needs, the construction of a new yard about four miles east of Elko is being considered. This yard would meet the design criteria set forth in Section 3 and replace in kind existing Western Pacific facilities necessary for an efficient operation. The track would be rearranged somewhat but the track footage would be replaced based on the existing quantities, and use. (See Exhibit 9-1)

The yard option, in brief, consists of:

- Siding; eastbound; westbound
- Cleaning tracks
- Classification and makeup tracks
- Fueling facilities
- Crew change building for Western Pacific
- Repair tracks
- Western Pacific office building, housing Division personnel

This option is applicable with any of the alternative alignment plans presented. The portion of the alignments considered would change from about



9·1 Schematic of Relocated Western Pacific Yard

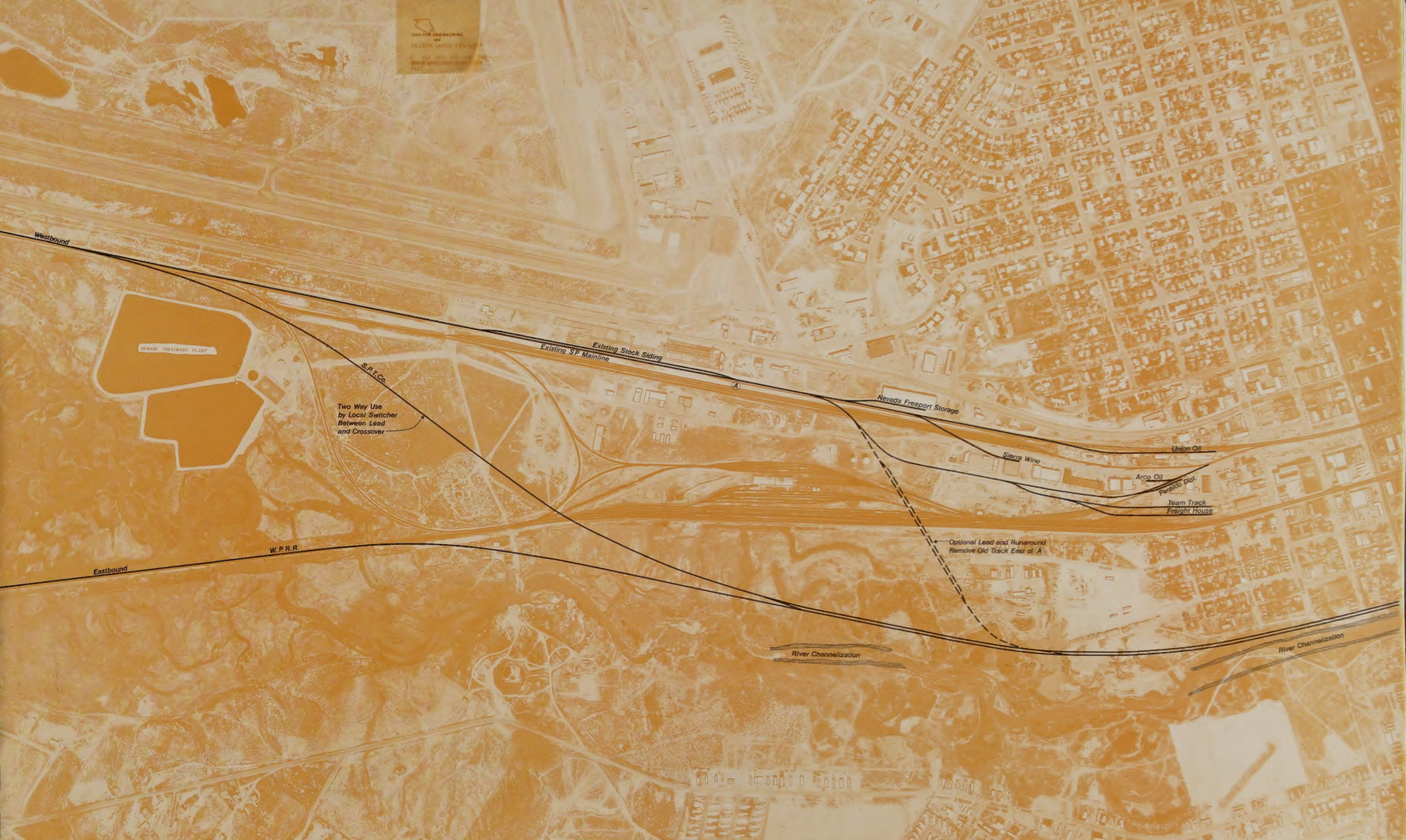
Third Street westerly to the vicinity of the sewage treatment plant. The alignment of the main lines through this area is shown on Exhibit 9-2.

COMPARATIVE ADVANTAGES, DISADVANTAGES, AND TECHNICAL CONSIDERATIONS RELATING TO THE YARD RELOCATION PLAN

After detailed analysis of the present yard facilities and possible arrangements of the yard track, cost estimates for leaving the yard in its present location versus relocation to a suitable location, and consideration of the effects on the community, natural environment and railroads, this alternative is worthy of serious consideration in any final alignment or configuration selected. Some principal technical advantages and disadvantages were identified and are tabulated below.

Advantages

- Eliminates the necessity of altering the river channel in the vicinity of the sewage treatment plant.
- Eliminates the placement of the west-bound detour track across the wetlands in the vicinity of the sewage treatment plant.
- Eliminates the noise within the City created by railroad yard activity alongside residential areas in west Elko.
- Reduce air pollution within the City created by railroad yard activity alongside residential areas in west Elko.



9·2 Proposed Alignment through Removed Yard

- Provides flatter curvature of tracks for faster through train traffic.
- Reduces right-of-way acquisition, relocations and business disruption.
- Improves visual quality of the area adjacent to the Central Business District.
- Improves efficiency of railroad operations.
- Facilitates expansion of railroad facilities in Elko vicinity increasing employment opportunities.
- Complies with City Master Plan.
- Facilitates future north-south vehicular river-railroad crossing and extension of Silver Street in western side of City.
- Facilitates development of City's commercial-light industrial area to the west.

Disadvantages

- Impact of location of new yard on natural environment is limited to open lands consisting of native sagebrush, pasture grasses, willow and smaller grasses common to project area.
- Will have noise and air pollution impact on open lands from yard activities.
- Requires about 500 feet of river channelization approximately 4000 feet downstream from the Fifty Street Bridge.
- To avoid proximity to existing residential areas, the main line trackage west of Elko would swing southerly, encroaching on river wetlands and flood plain area.
- Effluents from yard activities will necessitate treatment facilities for yard and human wastes.
- Necessitate the relocation of two to three miles of main line Western Pacific trackage.
- Requires long haul to deliver local freight and service to spur lines which will be perpetuated.

Table 9-1

PRELIMINARY COST ESTIMATE RELOCATED WESTERN PACIFIC YARD

RAILROAD ROADBED PREPARATION	
Cleaning, Earthwork, drainage	$ 750,000
TRACKWORK	
Mainline track	843,000
Yard track and turnouts	2,304,000
New track for industry near existing yard	168,000
RIVER RELOCATION	
Portion near existing yard	122,000
BUILDINGS AND FUELING FACILITIES	300,000
ACCESS ROAD	100,000
YARD LIGHTING	10,000
SURFACING INSPECTION ROADWAY	72,000
GRADE CROSSING	
No. 8 flashing lights	25,000
LAND ACQUISITION	30,000
SUBTOTAL	$ 4,724,000
APPURTENANCES @ 10% of construction costs	469,000
ENGINEERING AND CONTINGENCIES @ 20%	1,038,000
TOTAL COST	$ 6,231,000

Part III

Land Use Planning

SECTION 10. POPULATION AND LAND USE

11. CONCEPTUAL PLANS FOR DOWNTOWN DEVELOPMENT AND RIVERFRONT ENHANCEMENT

Section 10

Population and Land Use

INTRODUCTION

In the late nineteenth century the population of Elko declined sharply from a high of over 4,000 to 849 in 1900. This abrupt decline was due largely to severe reverses in local mining and cattle ranching. The construction of the Western Pacific Railroad in 1907 was a major factor in rejuvenating the City by providing service to the reviving local cattle and sheep ranching industries. A second major growth stimulus was the legalization of gambling in 1931 by the Nevada Legislature.

By 1970 the City's population had grown to 7,621, at approximately 70 percent the rate of increase of the entire state of Nevada for the period 1900-1970. The population of the City grew particularly rapidly during the period 1960-1970 due to increased tourism and local construction activities. However, overall since 1940 men reaching working age appear to have been leaving Elko and Elko County and the most likely explanation appears to be the relative lack of suitable jobs in the area.*

According to the 1970 census some 453 people belonging to racial minority groups lived in Elko. This is just under six percent of the City's population. Of this, 4.1 percent were Indian (a percentage which has remained relatively constant), 0.8 were Negro, and approximately one percent consisted of other racial minority groups. Most of the Indians in Elko reside in the northern part of the City, in the Elko Indian Colony.

PROJECTED POPULATION

City officials presently estimate Elko's population at 8,101. Using an annual average growth rate of 2.75 percent, the projected City population in the year 2003 is expected to be almost 18,000 people. This figure is somewhat less than that which results from extending the "moderate" (three percent per year) rate of increase used in the Elko City Plan.**

However, recent population trends for the City of Elko indicated that the "moderate" projected rate of growth of three percent (almost double the national average) may be somewhat on the high side. Accordingly, for the purposes of this report, particularly for the traffic projections, a more conservative estimate of future population growth was used. This projection is simply based on a continuation of recent trends and falls between the "low" and "moderate" projections of the Elko Plan.

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*Elko Plan. "Population -- Past, Present and Future"

**The Elko City plan assumed a 1973 city population of 8,500 and, using low (1.7 percent); moderate (3.0 percent); and high (3.8 percent) rates of growth projected 1993 estimates populations of 12,300, 15,500 and 17,900 respectively.

In addition to the growth of the actual city population, development is taking place in areas south of Elko, notably at Spring Creek, and Pleasant Valley. The residents of these areas work and shop in Elko and would benefit from relocation and consolidation of the railroads. Due to the fact that these developments are relatively new, it is impossible to project their future population size.

The community of Spring Creek, was founded in 1971. The mobile home estates are located about seven miles from Elko and the housing section about 12 miles south of Elko. Spring Creek includes 5,362 lots, to accommodate primarily single family mobile homes and houses. Using a factor of 2.8 persons per household, Spring Creek could reach an eventual size of over 15,000 people. However, due in part to such factors as the present economic situation, and the availability of jobs in Elko, growth has been relatively slow and Spring Creek has an estimated current population of 450 people.

Improvements in the national housing market and further expansion of the Elko economy could result in a substantial increase in the number of people dependent on Elko for employment and shopping.

EXISTING LAND USE, CITY-WIDE CONSIDERATIONS

Exhibit 10-1 shows the existing land use in Elko in 1972 at the time of the preparation of the Elko City Plan. Superimposed on the map are the three alternative railroad relocation plans and generalized concentrations of particular types of land uses.

Table 10-1

POPULATION GROWTH
ELKO, ELKO COUNTY, NEVADA - 1940, 1950, 1960, 1970

	1940	1950		1960		1970	
	Total Population	Total Population	% Gain over 1940	Total Population	% Gain over 1950	Total Population	% Gain over 1960
Elko	4,094	5,393	32	6,298	17	7,621	21
Elko County	10,912	11,654	7	12,011	3	13,958	16
Nevada	110,247	160,083	45	285,278	78	488,738	71

Source: Elko City Plan. "Population -- Past, Present and Future"

Table 10-2

POPULATION OF THE CITY OF ELKO - TOTALS -- 1900-1970

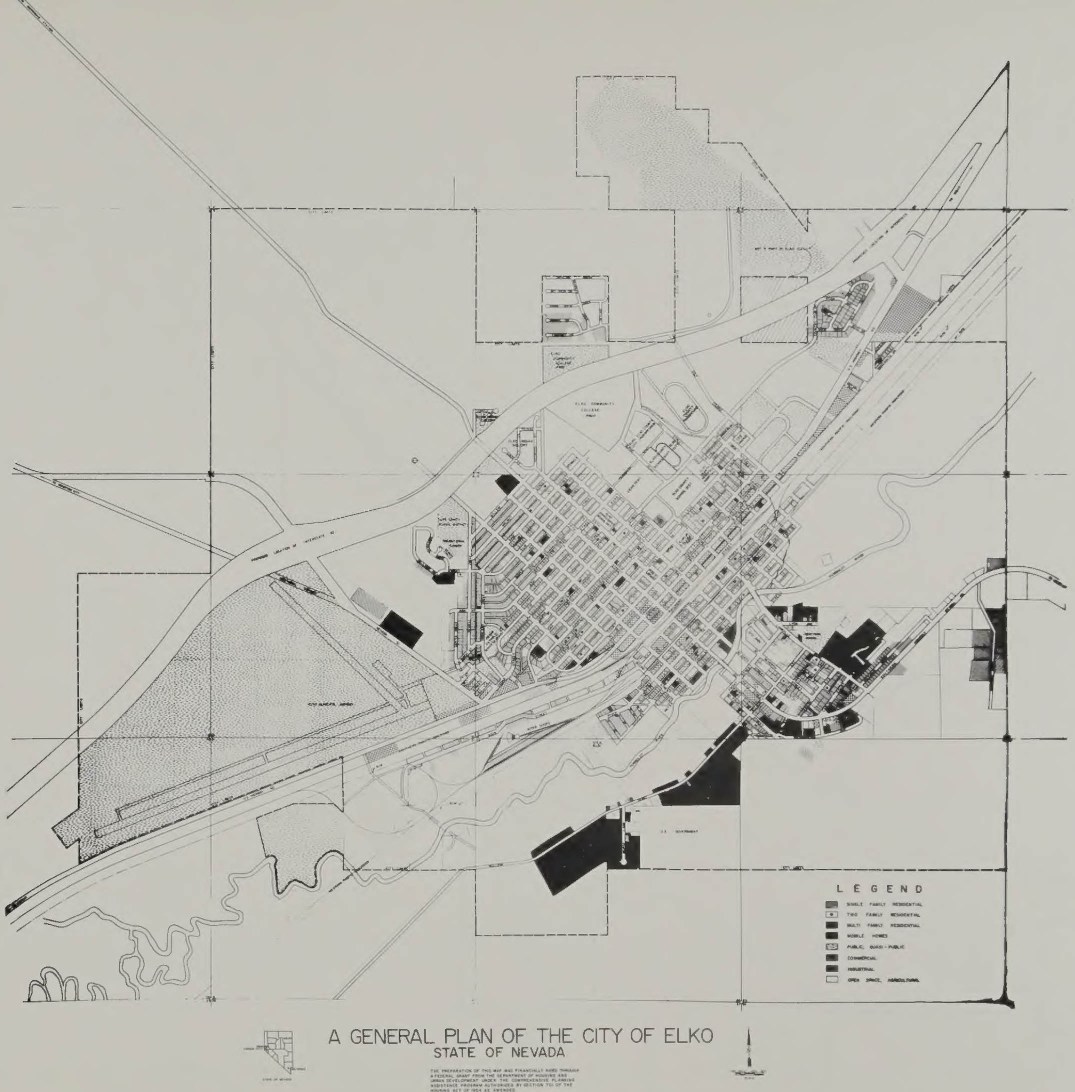
Year	Total Population
1900	849
1910	1,677
1920	2,173
1930	3,217
1940	4,094
1950	5,393
1960	6,298
1970	7,621

Source: Elko City Plan. "Population -- Past, Present and Future"

Elko's major residential area lies north of the Central Business District extending to the proposed location of Interstate 80. This area consists predominantly of moderate to higher income single family homes, with scattered small apartment complexes.

The second major residential area is the area south of the river which consists of single family homes and mobile homes, the latter being on both single lots and in trailer courts due to the fact that much of the area south of the river is zoned for mobile homes (Exhibit 10-2). Since national economic and housing conditions make such homes attractive for a significant section of the population, development of this area has been taking place rapidly in recent years. This has obvious implications for the increasing number of Elko residents who daily have to cross the railroad tracks to reach the business area, high school, and most other community facilities.

Between the Central Business District and the river, there is a third concentration of residential development. This is an area which would be impacted by any of the alternative railroad relocation plans. It differs from the other main residential areas of the City in two important respects -- it has a fairly high proportion of substandard housing, and in parts the housing is intermixed with other land uses. The small area west of Second Street is largely single family homes with a new trailer court presently being developed. Between Second and Eighth Streets, the residential development is interspersed with scattered small commercial and industrial establishments; while east of Eighth Street between Commercial and River Streets the area again becomes predominantly residential in nature.



THE PREPARATION OF THIS MAP WAS FINANCIALLY AIDED THROUGH A FEDERAL GRANT FROM THE DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT UNDER THE COMPREHENSIVE PLANNING ASSISTANCE PROGRAM AUTHORIZED BY SECTION 701 OF THE HOUSING ACT OF 1954 AS AMENDED.

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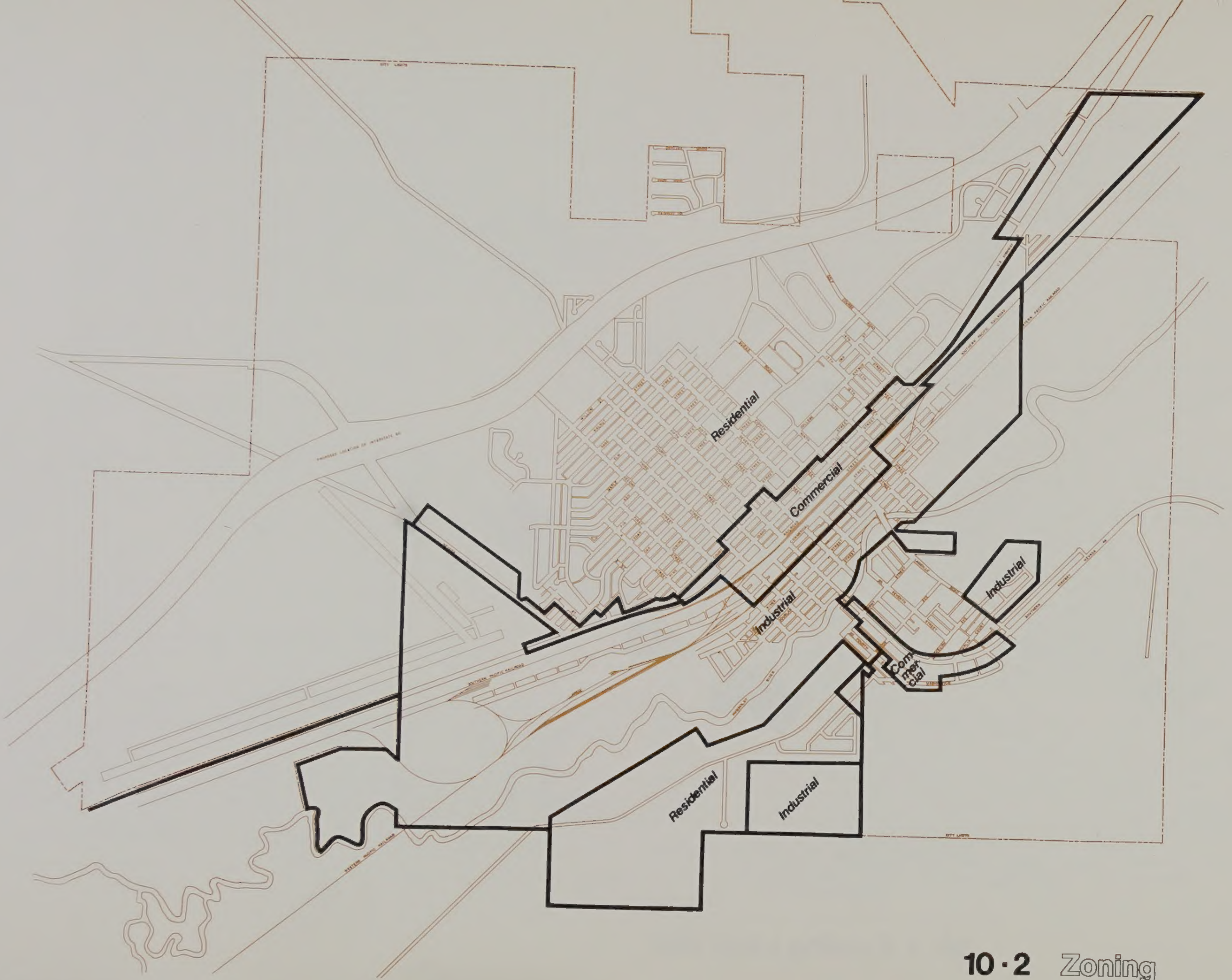
10 · 1 Existing Land Use


CITY LIMITS
PROPOSED LOCATION OF INTERSTATE 80
Residential
Commercial
Industrial
Industrial
Com-
mer-
cial
Residential
Industrial
SOUTHERN PACIFIC RAILROAD
WESTERN PACIFIC RAILROAD
CITY LIMITS

10 · 2 Zoning

Elko's main commercial area is still largely confined to the downtown area, consisting of two blocks north and two blocks south of the Southern Pacific railroad tracks. Idaho Street, which carries the U.S. Route 40 designation, is the main street in town and most of the convenience stores, such as supermarkets, drug stores, jewelry stores, sporting goods, and clothing stores are located along this thoroughfare. Commercial Street, fronting on the Southern Pacific railroad tracks, traverses the second major commercial area and, together with Railroad Street forms a center for tourism and gambling. Some smaller cafes and retail stores are located along River and Silver Streets, south of the tracks, but commercial activity is of lesser significance in this area.

On the extreme east end of town, abutting U.S. 40, is a newer shopping center, Elko Shopping Plaza, which contains, among other stores, a large supermarket and "junior" department store.

The Elko Central Business District plan states that the major disruptive and incompatible use in the Central Business District are the Southern Pacific and Western Pacific railroad tracks. It also states that "Downtown Elko's major strength lies in the wide range of services and activities available. Retail stores, casinos, hotels, motels, and offices are all found in the Central Business District. An improvement in any one downtown activity will have a positive effect on the rest."

The plan anticipates that once the railroads are relocated, and further improvements take place, such as increased parking, easier access, and availability of developable land, there will be a "snowballing" effect which, accompanied by other recommendations, will help rejuvenate downtown.

Two other major categories of existing land use are of significance in this analysis: industrial land and park land. Elko's main industrial area lies on the south side of the railroads, generally in the area between Fifth and Twelfth Streets, although there is a small industrial district between River and Douglas west of First Street. There are no industries in Elko which can be considered "heavy industry"; most of the industrial area consists of bulk oil storage units, warehouses, and coal and lumber yards, several of which depend on access to the railroad for daily operations.

City Park, consisting of 34 acres and located on the north side of town at College and 14th Streets, and Southside Park (five acres) just south of the river between Seventh Street and Lamoille Road, are Elko's two parks. The existing Southside Park would be disrupted by the railroad relocation if either the north bank or the south bank alignment was adopted. The City's parks, and the implication of the project for future park land, are discussed in detail in an accompanying "4f" statement.

PROPOSED LAND USE

The Elko City Plan incorporates the north bank alignment with parallel channelization of the river and overpasses at Fifth and Ninth Streets. At the time of the preparation of the plan the north bank alignment was the preferred alternative of the community. (Exhibit 10-3)

For one block north of the indicated railroad relocation, from the vicinity of 'A' Street on the west to Ninth Street on the east, the area is proposed for general industrial use. East of Ninth Street the proposed industrial area gradually expands until, from east of Twelfth Street, the entire area bounded by the existing S.P. track and the 1972 proposed railroad relocation alignment on the south is designated for general industrial use.

Only at one location on the north bank does future residential land use directly abut the indicated railroad relocation. This is the area bounded by River, Douglas, 'A' and 'C' Streets which is shown for mobile home use and part of which is currently being developed as a mobile home park. Otherwise future residential land use on the north bank is indicated to be at least one block from the relocated tracks, and this residential use is a single block-wide strip of land between River Street and Douglas Street. Most of the area north of this is shown for general industrial use or for Central Business District development. It is important to note that this area, between the present Central Business District and the river, is an area of transitional land use and is not an area particularly suited for residential use.

Along the river itself the plan indicates a narrow "green belt" a half to one block wide from approximately the Ninth Street bridge on the east to an extension of Front Street on the west. At each end of this narrow band south of the river there is a proposed park and recreation area.

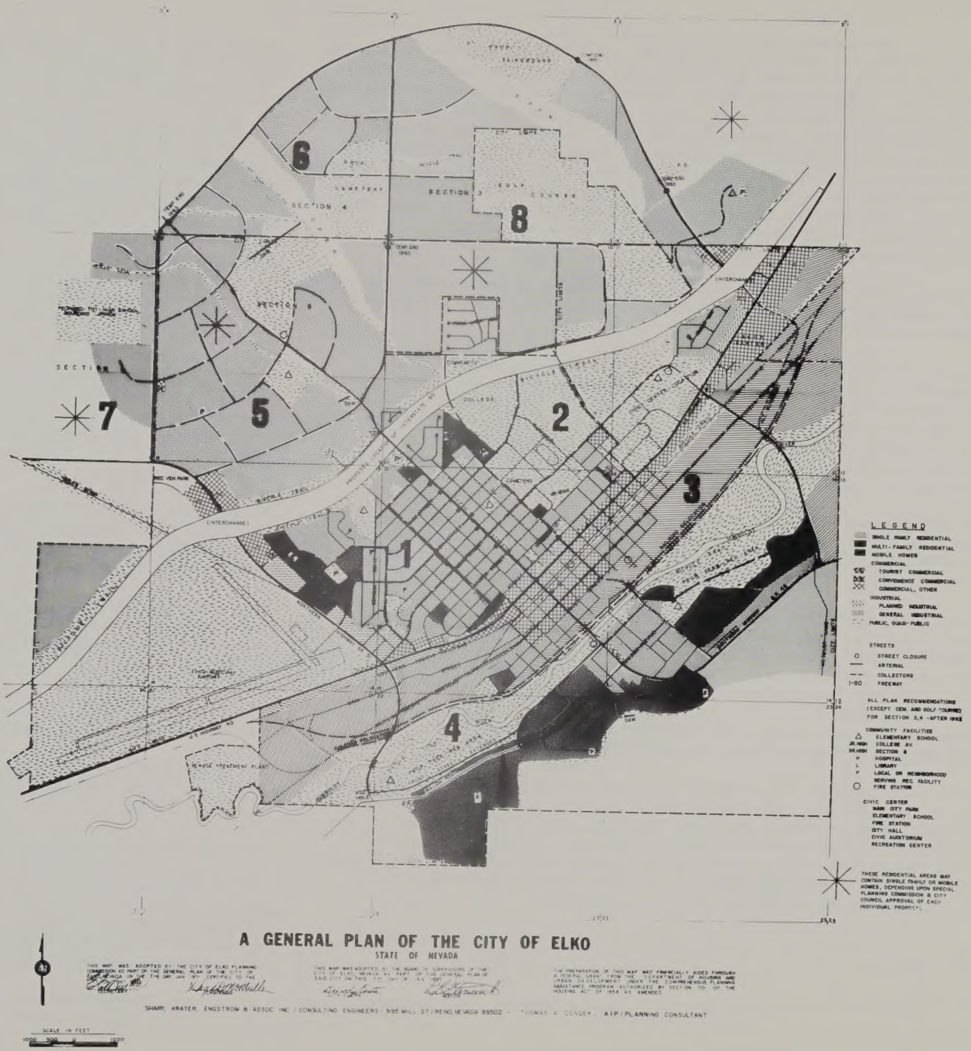
Most of the remaining area south of the river is designated for mobile home and single family residential development, with the exception of a convenience commercial center on the east side of Fifth Street between Front Street and Wilson Avenue.

EXISTING LAND USES IN IMMEDIATE VICINITY OF TRACKS

Existing land uses fronting on the railroad tracks along Railroad, Commercial, and Silver Streets (between Third and Twelfth Streets) are summarized in Table 10-3.

Residential units constitute the major land use abutting the tracks. Out of a total of 53 dwelling units, 48 units are private residences, four are rooming houses, and one is a mobile home. Silver Street has the greatest number of dwelling units (24), followed by Commercial Street with 22, and Railroad Street with seven. Dwelling units on these streets are congregated along the following blocks: on Silver between Fifth and Eleventh; on Commercial between Eighth and Eleventh; and on Railroad between Seventh and Eighth.

Based on a recent survey, the condition of the residences in this area can


A GENERAL PLAN OF THE CITY OF ELKO
STATE OF NEVADA
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SCALE IN FEET
1000 500 0 1000
LEGEND
SINGLE FAMILY RESIDENTIAL
MULTI-FAMILY RESIDENTIAL
MOBILE HOMES
COMMERCIAL
TOURIST COMMERCIAL
CONVENIENCE COMMERCIAL
COMMERCIAL, OTHER
INDUSTRIAL
PLANNED INDUSTRIAL
GENERAL INDUSTRIAL
PUBLIC, QUASI-PUBLIC
STREETS
STREET CLOSURE
ARTERIAL
COLLECTORS
I-80 FREEWAY
ALL PLAN RECOMMENDATIONS (EXCEPT CEM. AND GOLF COURSE) FOR SECTION 3,4 - AFTER 1985
COMMUNITY FACILITIES
ELEMENTARY SCHOOL
JR. HIGH COLLEGE AV.
SR. HIGH SECTION 8
H HOSPITAL
L LIBRARY
P LOCAL OR NEIGHBORHOOD SERVING REC. FACILITY
FIRE STATION
CIVIC CENTER
MAIN CITY PARK
ELEMENTARY SCHOOL
FIRE STATION
CITY HALL
CIVIC AUDITORIUM
RECREATION CENTER
THESE RESIDENTIAL AREAS MAY CONTAIN SINGLE FAMILY OR MOBILE HOMES, DEPENDING UPON SPECIAL PLANNING COMMISSION & CITY COUNCIL APPROVAL OF EACH INDIVIDUAL PROPOSAL
1
2
3
4
5
6
7
8
SECTION 4
SECTION 3
SECTION 8
CEMETERY
GOLF COURSE
FAIRGROUND
COLLEGE
CEMETERY
BICYCLE TRAIL
(INTERCHANGE)
U.S. HIGHWAY 40
SEWAGE TREATMENT PLANT
DAM
CITY LIMITS
CIVIC CENTER LOCATION

10·3 Proposed Land Use

be summarized in approximate figures as follows: 67 percent in satisfactory condition; 16 percent in need of repair; 13 percent deteriorated; 2 percent dilapidated.

Commercial establishments represent the second most prevalent land use in the area bordering the railroad tracks. Of the 35 commercial properties along the three streets, Commercial Street has the highest number with 18. This is followed by 12 businesses on Railroad Street and five on Silver Street. Commercial establishments are concentrated on: Commercial Street between Third and Eighth Streets; Railroad Street, between Third and Sixth Streets and Silver Street, between Third and Fourth Streets.

Restaurants and bars, combined, account for approximately one-third of the total commercial establishments; hotels and motels for approximately one-tenth; and all other retail establishments for about one-half of the total. Two of the major hotels and casinos in town are located along this commercial strip. Stockmens Hotel fronts on the Southern Pacific tracks, while the back of the structure abuts the Western Pacific tracks. The Commercial Hotel is located beside the Southern Pacific tracks.

The relatively small amount of local industry in downtown Elko makes it practicable for almost all existing tracks to be removed and relocated; it is not necessary to leave extensive trackage remaining in place to serve local industries.

IMPACTS OF EXISTING RAILROAD OPERATIONS ON EXISTING LAND USE

The presence of the Southern Pacific and Western Pacific Railroads has several negative influences for properties fronting on the tracks. The major direct impacts include access problems, noise, parking problems, general visual blight, and inconvenience. These impacts contribute indirectly to a general decline in the attractiveness of Elko's CBD as a location for business and industry, which could result ultimately in the steady decline of property values.

Although existing train operations create difficulties for all categories of land use in the immediate vicinity of the tracks, each type of usage is affected in a unique manner and to a different degree.

Residential

Of the adverse impacts on adjacent properties created by the railroad tracks, the most significant for residential dwellings are noise and associated vibration. Noise impacts are discussed more thoroughly in Section 15.

Annoyance caused by noise in the vicinity of the railroad corridor results in a general decline in livability in the area. This is perhaps reflected in the high percentage of structures located in this area which are either

Table 10-3

NUMBER OF STRUCTURES FRONTING RAILROAD TRACKS BY LAND USE TYPE AND STREET

FRONTING ON STREET	RESIDENTIAL NUMBER	COMMERCIAL NUMBER	LIGHT INDUSTRIAL/ WAREHOUSES WHOLESALE NUMBER	SERVICE/ PROFESSIONAL NUMBER	INSTITUTIONAL NUMBER
Silver Street	24	12	11	-	-
Commercial Street	22	18	5	6	1
Railroad Street	7	5	8	5	2
Totals	53	35	24	11	3

Note: Table does not include nine other miscellaneous structures, most of which are presently vacant.

deteriorated or dilapidated.

Commercial and Professional

Noise and vibration have an obvious adverse impact on commercial properties in the immediate vicinity of the tracks. Restaurants and bars, establishments which people patronize to relax, are especially impacted by noise. Hotels and motels, which depend upon quiet conditions for sleeping, are even more severely affected. Other retail establishments would be inconvenienced by the passage of trains which interferes with speech and disrupts indoor activities.

With the at-grade crossings serving as the only means of traversing the tracks, passage of a train through town can block access to commercial establishments on either side of the tracks often for as much as seven minutes, and sometimes much longer. Obviously, this can have an adverse influence on business establishments.

The tracks are also responsible for the inefficient layout of parking facilities along the area between Commercial and Railroad Streets, and this is a further adverse influence on business. Offices and professional establishments are generally affected by the railroad in a manner similar to commercial properties.

Institutional

The police and fire stations which front on the S.P. railroad tracks face potential response delays when answering calls. The problem is most severe for properties on the south side of the tracks, since most of the essential service equipment is located north of the tracks. This situation is discussed more fully in Section 23.

The church located on Commercial Street between Tenth and Eleventh Streets is the other institutional establishment adversely impacted by noise from railroad operations.

Light Industry/Warehousing/Wholesale

In general, light industrial uses would be much less adversely affected by the presence of the railroad tracks than any other land use. This is mainly attributable to the fact that a significant number of people do not use these structures on a daily basis. Such structures as warehouses and power yards function primarily for storage. Coal and lumber yards and some storage and warehouse operations actually benefit from proximity to the railroad tracks since they may be served by spurs.

HOUSING

The Elko Comprehensive Plan identified two areas of serious housing deficiency within the City. One of these areas is likely to be affected by displacement and other impacts resulting from any one of the project alternatives. This is the area between Third and Twelfth Streets, extending from Commercial Street to the Humboldt River where "there are numerous structures with obvious deficiencies." The plan anticipated then, on the assumption of a north bank realignment of the existing railroad tracks, that 30 to 40 housing units would be eliminated by the railroad consolidation and that the City and Federal governments would be responsible for providing a decent home and a suitable living environment for the displaced families. The actual numbers range from 115 to 56 housing units, depending on the alternative railroad relocation plan, and not including rooming houses.

At the time of the 1970 U.S. Census there were an estimated total of 2,725 housing units in Elko of which 2,555 were occupied and 169 were vacant, for an overall vacancy rate of 6.2 percent. Indications are that this rate has dropped substantially due to the City's continued population growth, the rising cost of new housing and high interest rates (necessitating higher down payments and monthly payments). Present vacancy rates are estimated at 2 percent for houses and less than one percent for apartments. Even without the present national housing situation, finding replacement housing in a small city such as Elko becomes a particularly difficult problem.

It appears that in recent years the amount of residential construction has not kept pace with the City's population growth. Elko has only one contractor who builds housing in "volume". Although there are other contractors, most of these builders construct a limited number of custom homes. To compound this problem, skilled construction workers are generally concentrated in the Reno and Las Vegas metropolitan areas. Therefore, if a builder wants to construct homes in volume he must bring in many laborers which, in turn, drastically increases the costs of construction. So, in addition to the physical problem of finding replacement housing, there is the problem of cost, or in other words finding housing which is within the economic means of affected families. Even if a tract of homes was built in Elko they would tend to cost more than the same units would cost if they were built in the metropolitan areas of the state: "...the median sale price for new homes has increased from $23,000 to $28,000 in the Reno area and from $22,000 to $27,000 in the Las Vegas area in the last three years according to FHA surveys conducted in 1971, 1972 and 1973. Interviews with contractors and the State Highway Department indicate a comparable home costs much more in rural areas due to higher material and labor costs..." *

In addition, both residential and business/commercial construction compete for the limited supply of builders and skilled labor. Table 10-4 shows that between 1969 and April 1974 there has been a substantial amount of commercial construction which in turn, tends to draw the limited labor which might otherwise be available for residential construction.

In Elko, as nationally, residential construction has been hit by the record breaking interest rates and rising cost of building materials. This high interest has just about dried up the supply of interim construction money.

The rising costs of housing in Elko is also being affected by the availability and prices of land. Much of the land in and/or near the City limits is owned by ranchers, the City and a few individuals. This limits availability with the result that some land within the city has increased in price by 40 percent over the last three years.

Exhibit 10-4 shows the number of new single family residences built per year for the City of Elko compared to the number of new mobile homes added per year over the 1969 to April 1974 period for Elko County. Assuming that housing starts will be down due to the tight money situation, it is estimated that 15 single family homes will be built in 1974. "one of the principal reasons that homes and apartment buildings are not being erected rapidly enough to meet Nevada demands in 1974 is that the prime lending rate has been increased -- to 11.75 percent, and the usury rate established by law in Nevada is 12 percent. That means the lending agencies which have historically provided interim construction money...no longer have available to them the margin of profit they need to operate. As a result, many lending agencies are no longer providing interim finance money - and the construction of homes and apartment buildings has abated proportionately (See Table 22-4) *

The implications of the existing housing situation in Elko, therefore, are:

- The community has what might be termed a "tight" housing market, especially for low rental units.
- The residential area which would be most severely impacted by several of the alternative railroad realignments is described as one with "numerous structures with obvious deficiencies."
- The Comprehensive Plan indicates future use of this area should be mainly for industrial use.
- Relocation assistance will be necessary, and will be made to homeowners and renters of some 115 to 56 housing units, plus permanent residents of rooming houses, depending on the alternative adopted.

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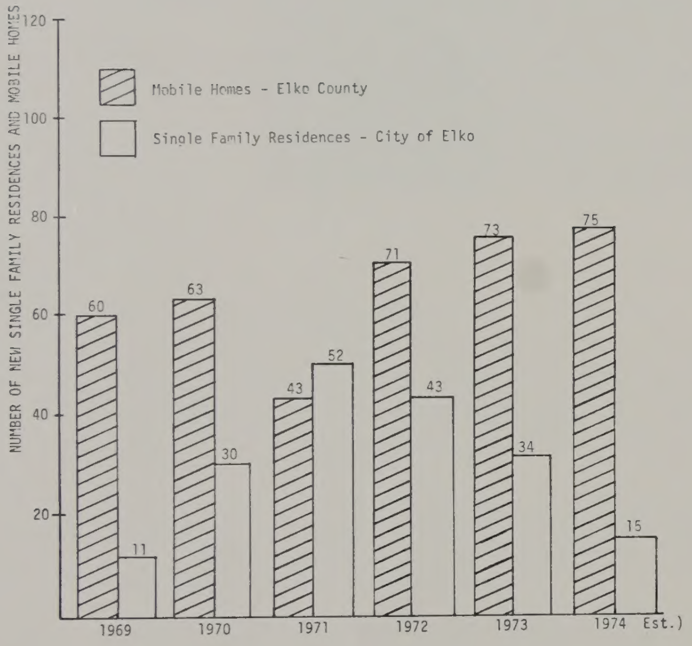
* The Housing Situation in Nevada: Phase Two, Nevada Urban Planning Division, June, 1973.

* The Housing Situation in Nevada: Phase Two, Nevada Urban Planning Division, June, 1973.



10-4 SINGLE FAMILY RESIDENCE VERSUS MOBILE HOMES

Table 10-4

NUMBER OF BUILDING PERMITS
RESIDENTIAL AND COMMERCIAL
CITY OF ELKO - 1969 to 1974

	Single Family Residence	Duplexes	3-4 Plexes	Apartments	Business/ Commercial*
1969	11		1		12
1970	30	2	2		8
1971	52	2			3
1972	43	4	3	12	10
1973	34	1			15
1974**	4				1

Source: City Building Inspector - Elko
*Includes remodeling permits greater than $50,000
**Through April 1974

Note: Average increase in valuation 1969 - 1974

Single Family Residence	$16,482 to $22,250
Duplexes (per living unit)	$10,250 to $16,500

Section 11

Conceptual Plans for Downtown Development and Riverfront Enhancement

DOWNTOWN DEVELOPMENT

The North Bank, South Bank, and the Silver Street railroad relocation alternatives each call for removal of tracks from the central open plaza between Railroad and Commercial Streets. This section explores opportunities which removal of the tracks presents for reuse of the vacated space to improve the downtown area of Elko.

Elko's downtown serves a function far greater than that indicated by the approximate 8000 population of Elko or the 15,000 residents of the surrounding trade region. The business district is central service and supply center for a ranching region extending up to 100 miles from Elko and for travel on Interstate 80 between Reno and Salt Lake City.

Expanding population, travel patterns and other economic indicators suggest a doubling of retail demand by 2003 and an even faster growth in hotel-motel-restaurant-commercial recreational market. Expansion of the downtown in response to this market increases benefits not only to the downtown merchants, but to all residents of the City, region, and surrounding tributary since the greater size diversity of activities within downtown makes available services not found in smaller special purpose centers.

The central business district in the area between Third and Ninth Streets, and between Silver and Court Streets, is focused on three streets paralleling the tracks -- Idaho, Railroad and Commercial. Gradually, downtown retail, service, government and recreation businesses have found the railroad severence is limiting in terms of what Elko's downtown could be like free from noise, vibration, traffic, hazards and inefficient use of space. Relocation of the tracks from downtown presents an opportunity for the Central Business District to retain its dominant position in Elko by providing additional parking and floor space, restructuring the circulation and parking pattern, and improving the visual appearance. Concerted action will be necessary to achieve downtown development and that railroad relocation is a cornerstone to implementation.

Downtown Elko's major strength lies in the wide range of services and activities available. Retail stores, casinos, hotels, motels, restaurants and offices are all found in the downtown area. And, the expansion of any one activity tends to have spinoff benefits for other activities. For example, an increase in tourists utilizing the casinos and motels could also increase retail trade, or an increase of offices in or near downtown Elko could increase retail and restaurant trade.

The Central Business District presently includes the following functions:

- The majority of the retail business located in Elko -- the principal retail outlets front on Idaho Street -- retail shopping should constitute the core of the downtown.
- The three largest hotel-restaurant-commercial recreation facilities in Elko -- the Commercial and Stockmen hotels -- lie immediately west

of the retail core on Third Street and the Ranch Inn lies immediately east of the retail area on Eighth Street. Combined commercial recreational and retail activity creates an elongated core paralleling Idaho Street from Third Street eastward.

- Private and governmental offices surrounding and adjacent to the core which help support CBD retail businesses. Office workers during their noon hour obtain services and goods in the area.
- Easy access from the City's two major highways, U.S. 40 and State Highway 46.
- Space for parking -- a substantial amount of parking already exists and additional can be developed with railroad relocation.
- A compact shopping, office and tourist center in which walking distances are relatively short (0-3 blocks).
- The highest property values in the City.

Downtown Elko contains the same variety of stores, type and size as those found in what marketing people call a "typical" neighborhood shopping center. The single exception is the absence of a major variety/department store (Table 11-1). A variety/junior department store at the heart of the retail area would serve as a single focus and a major customer draw.

To encourage the department or variety store to locate in downtown Elko, the following might be done:

- Guarantee the store a prime location within the Central Business District and at a low cost.
- Demonstrate, through thorough market analyses, that the new store in combination with the wide variety of existing stores in downtown Elko and supporting tourist trade would draw a supportive market.

A department or variety store should be placed as close as possible to complementary retail shops -- women's clothes, gifts, etc. Also of importance is proximity of parking and access from tourist facilities, i.e., hotel and commercial recreation customers should be encouraged to shop in the retail complex. The desirability of assembling enough centrally located space and shaping the existing lineal retail area into a more compact unit would make it most opportune to be able to utilize vacated railroad right-of-way between Railroad and Commercial Streets.

Conceptual Plans

Exhibits 11-1 and 11-2 illustrate alternate development concepts for land along the vacated Southern Pacific right-of-way. Exhibit 11-1 features designation of the area between Railroad and Commercial Streets for parking or public park/open space use. Expansion of hotel/casino floor space would be handled on lands facing the central public open area. This scheme assumes property originally transferred by land grant to the railroads and which by law must revert to the government if no longer used for rail traffic, would not be suitable for private purchase or public lease to private enterprise for development. This plan envisions that additional parking spaces (20-30 percent increase), reorientation of parking/traffic circulation, occasional landscaping, and removal of overhead wires, poles and fencing will provide

Table 11-1

RETAIL SALES AND SERVICES IN ELKO

Square Feet of Floor Space (in 1000's)

	Elko CBD[1]	Typical Neighborhood Facility[2]
Food and Food Services		
Supermarkets	15.2	17.6
Restaurants	4.0	4.0
Other -- Bakeries, Specialty Foods, etc.	1.8	13.3
General Merchandise and Apparel		
Junior Department Stores & Variety Stores	0.0	23.9
Ladies' Specialty	6.0	7.9
Other -- Children's Shoes, Fabrics, etc.	10.8	12.5
Furniture and Home Furnishings		
Furniture	5.0	4.5
Other -- Floor Coverings, Radio, TV, etc.	1.2	3.2
Other Retail		
Hardware and Auto Supply	10.0	9.3
Drugs	5.3	5.9
Other -- Gifts, Hobbies, etc.	15.1	22.2
Service Facilities		
Banks, Financial	9.0	8.1
Other -- Barber, Laundry, etc.	4.3	9.7
Total	87.7	100.1

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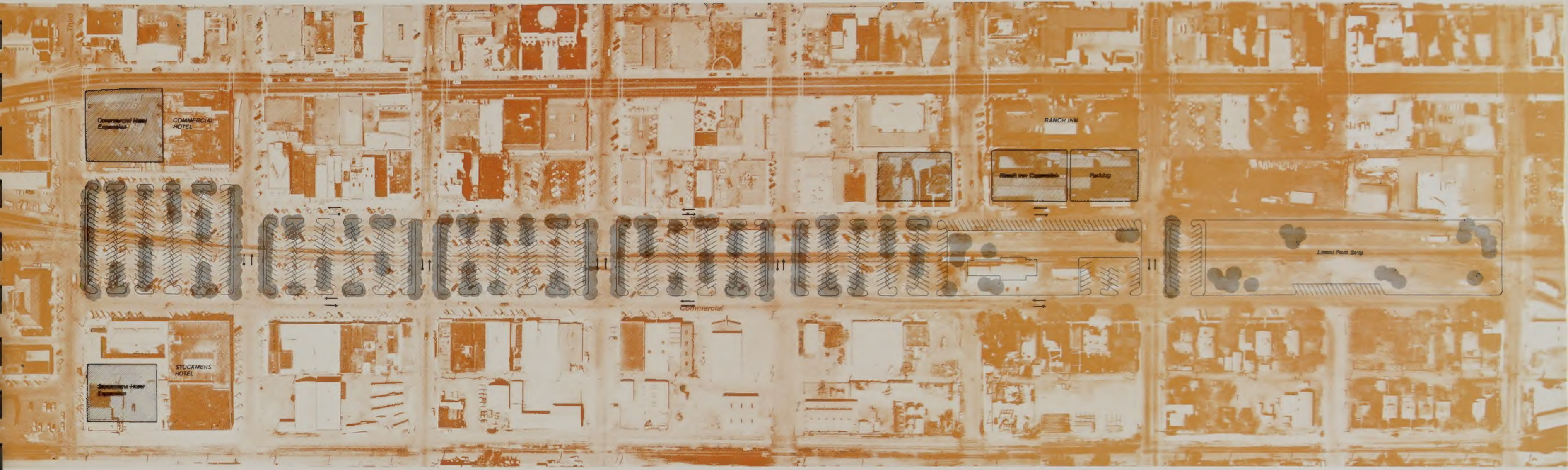
[1] Area bounded by Third, Sixth, Silver and Court Streets, 1972

[2] The Dollars and Cents of Shopping Centers, Urban Land Institute, 1969

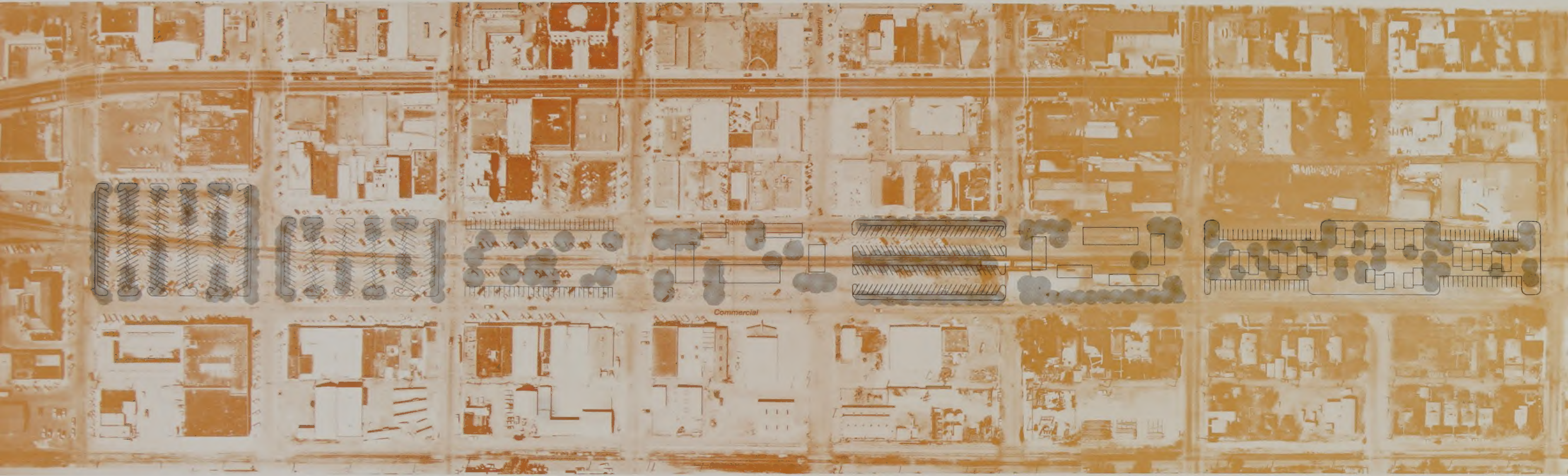


11·1 Parking Development of Railroad · Commercial Streets

the catalyst for casino and hotel expansion and accompanying increase in retail business. A new hotel-restaurant-commercial recreation complex is envisioned at the east end of the CBD to complement the Stockmens and Commercial Hotels at the west end. Parking expansion, to be derived from railroad relocation should accommodate a 50 percent expansion in commercial recreation floor space.

Exhibit 11-2 assumes that the question of title to vacated railroad lands can be resolved sufficiently to allow lease of the vacated railroad alignment to private developers who would build according to a pre-determined plan for building size, use design, etc. In Elko, the long term lease might provide the legal means to build on the former railroad land for public purposes (optimum economic development of the region and community benefit) without sacrificing public ownership of the land.

The Exhibit 11-2 plan envisions clusters of commercial structures on the railroad alignment around Fifth and Eighth Streets to complement the existing retail function. Housing (duplexes, or attached single family units) is proposed on the east end of right-of-way designed to buffer existing residences south of Railroad Avenue from industrial uses to the north. These dwellings might also fulfill a function of replacement for housing displaced by railroad relocation.



11·2 Parking and Commercial Development of Railroad - Commercial Streets

Commercial Recreation

The commercial recreation sector provides significant numbers of primary jobs for Elko residents, as well as generating other jobs in the ancillary service areas. Included in this latter category are hotels, motels, restaurants and a variety of personal services. The city could seek to develop commerical recreation or parking support to such facilities in the land areas made available by the relocation of the railroad tracks, providing there is no legal barrier to such a move.

Analysis completed shows that there is an apparent market for doubling, tripling or quadrupling the present square footage of commercial recreation floor space, during the period to 2003. (See Section 28.) If Elko is to maximize its tourist industry potential, it is imperative to expand the recreation floor space in the downtown area.

Elko's downtown hotel-restaurant-commercial recreation facilities will enjoy greater business activity due to the relocation of the railroads. Railroad noise and disruption will no longer dissuade tourists from stopping in downtown Elko. Increased parking made possible by track removal will increase the ability of the hotel-restaurant-commercial recreation facilities in the central area to handle customers and allow commercial expansion of floor space.

To further enhance Elko's tourist attraction, downtown Elko could develop a promotional program and adopt a single identifying theme, e.g., Elko as the last authentic western frontier. Downtown hotels and retail merchants could follow through on this image by adopting store front motifs, street furniture, sales gimmicks, and organization of special events in the downtown area. The following promotional efforts are possible:

- In storefront design and advertising refer to Elko's historic heritage, e.g., the City's origin as a rail and cattle town, Basque culture, Indian crafts, mining.
- Develop the downtown area around Elko's historic background as a railroad and range town, e.g., western frontier motif, stage coach rides, etc., with similar sidewalks and landscaping throughout.
- Continue to sponsor community events designed to entertain, educate or intrigue visitors, e.g., Basque Festival indoor or outdoor displays of Indian crafts, stockman's trading post, auctions.
- Sponsor special package offers to rail, air or bus travelers which would include dining, dancing, hunting, gambling and lodging, for a pre-set price. This promotional package could be nationally advertised.

Office Development

The downtown area is surrounded by several office structures. Offices located in the downtown area will support the retail and recreation functions of downtown Elko. Office personnel will frequent stores and restaurants during the noon hour and entertain business associates in the motor motels and casinos. Elko should endeavor to entice more offices to locate in the downtown area. A new office structure might be built upon the abandoned right-of-way on Third Street between the Post Office and Railroad Street.

Riverfront Enhancement

Relocation of the railroad tracks to the Humboldt River could provide the catalyst for upgrading the riverfront environment -- visually, naturally and neighborhood liveability-wise. Requirements for railroad right-of-way river channelization, acquisition of earth fill material, flood protection, noise mitigation, park replacement, and provision of local access give rise to opportunities throughout the riverfront corridor to counter the present unsightly appearance, flood hazard, and untapped recreation opportunities along the waterfront. Joint plans for the railroad location and riverfront enhancement (applicable to both the North and South Bank Alternatives) are presented not merely to offset problems which railroad relocation might pose, but to gain the greatest southside neighborhood and overall community benefit from the relocation project.

Exhibits 11-3 and 11-4 illustrate joint railroad relocation/riverfront enhancement schemes for north bank and south bank, respectively. Each scheme includes within the concept a short landscaped earth berm 4 - 5 feet high on both sides of the railroad track for visual and noise screening for adjacent residential areas. Southside parkland displaced for railroad right-of-way would be replaced by acquisition of land contiguous to the present park (North Bank alternative) and a new park site east of 4th Street, centrally located in a rapidly growing residential section (South Bank alternative). An off-channel lake is proposed on present quarry and Bureau of Land Management properties north of the Humboldt River and immediately west of the built-up urban area. Access to these properties will be taken by the North and South Bank alternatives and earth materials which could be obtained from these sites would be used in constructing railway embankments and earth berms.

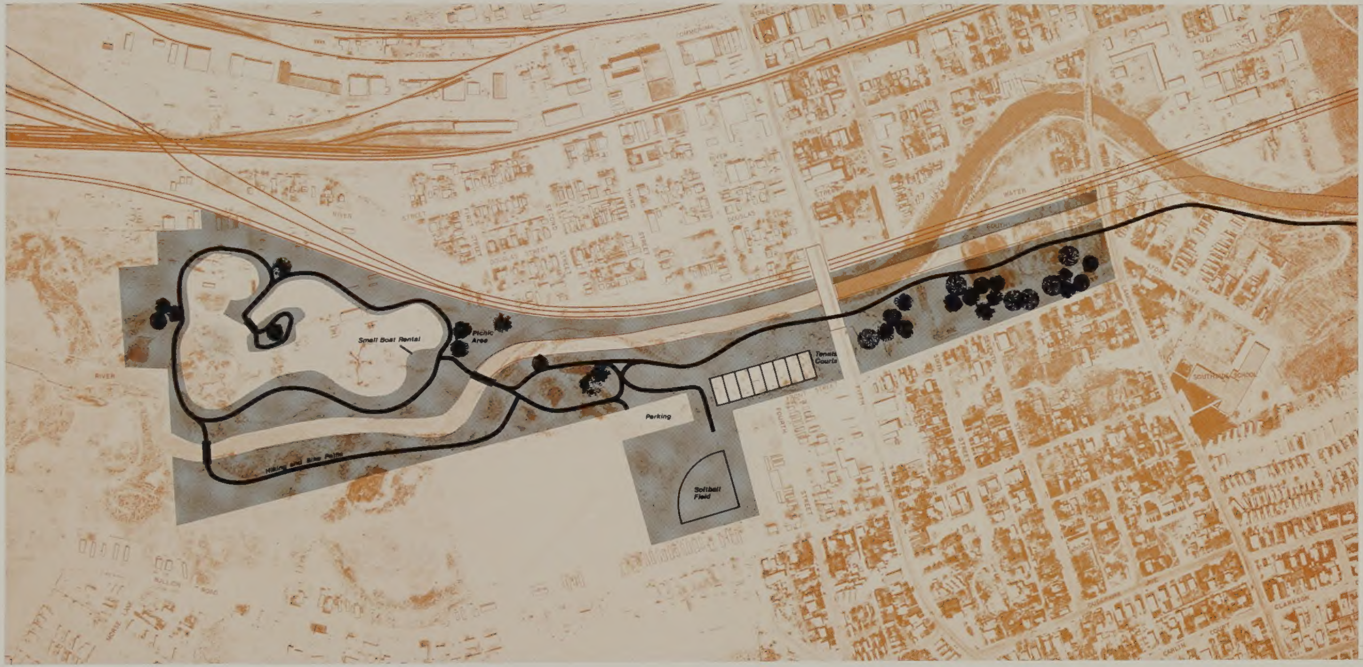
The conceptual plan for riverfront enhancement is composed of several elements. Of major consideration is a proposed lake formed by excavation of fill material for the railroad. In addition, all landscaping proposals emphasize use of low maintenance material. The location of a proposed lake is considered with regard to water quality, flushing, and potential recreational experience. Finally, attention is given to the implementation of proposals for riverfront enhancement and the responsibilities of both the railroad project and the City of Elko.

Lake Size

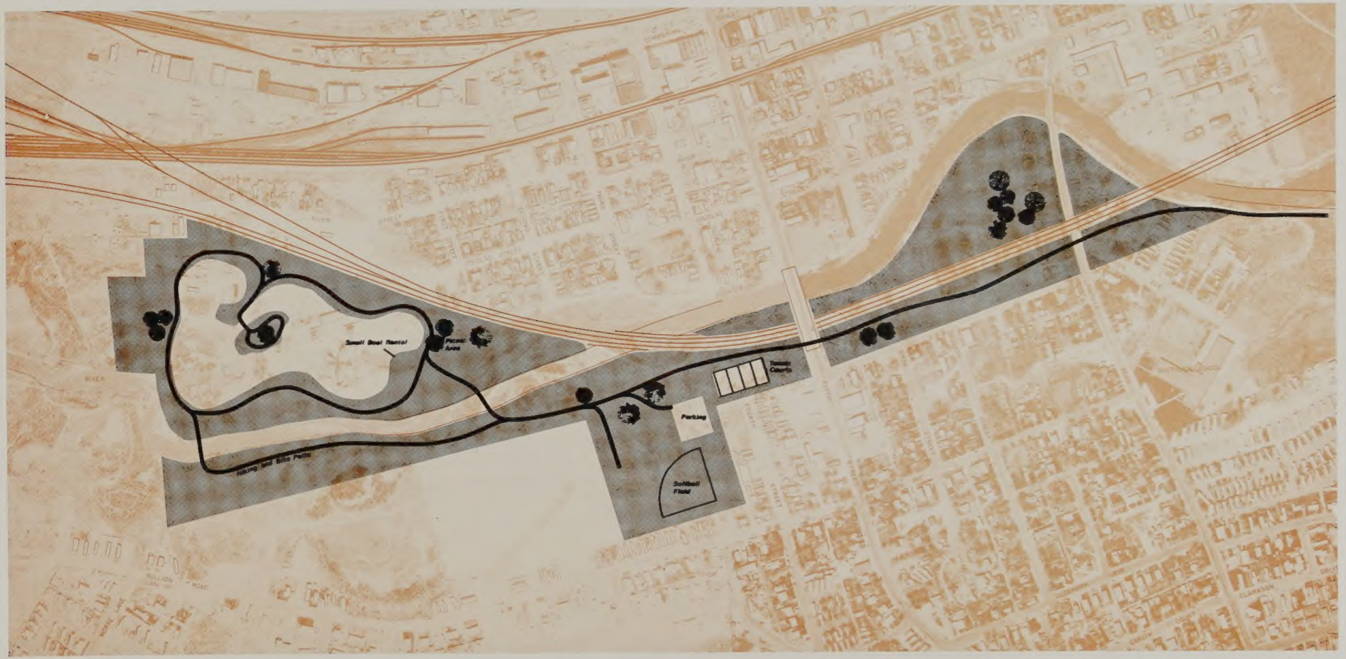
The size of lake is determined by three factors: recreation usability, railroad fill requirements, and fill requirements for other contiguous park land. Preliminary calculations indicate that approximately 156,000 cu. yds. of gravel and fines will be required for the railroad. This material could be obtained from the proposed lake site. The site is presently occupied by a gravel and sand quarry and abandoned gravel pits are in evidence, suggesting the area probably can supply the needed gravel and fine burden material, consisting of clays, topsoil, and other flood plain soils, ever, may be covered by considerable overburden. For this preliminary analysis, therefore, it is assumed that 60 percent of material excavated from the lake and channelization areas would be suitable for railroad fill. Such an excavation will produce a lake of approximately 15 acres in size with large areas at least 15 feet below the existing ground water level which will be necessary for adequate fish propagation. A lake of 15 acres is large enough for canoeing and interesting recreational experiences. The overburden material, consisting of clays, topsoil, and other flood plain soils, will be used for fill in the park clays, surrounding the lake. This can be used to contour areas presently gullied by abandoned river channels and not suitable for recreation activities.

Landscaping and Maintenance

Low maintenance landscaping will be an essential part of plans for river-



11·3. Riverfront Plan · North Bank Alignment



11·4. Riverfront Plan · South Bank Alignment front enhancement. Landscaping that requires the least maintenance involves the use of natural plant materials presently on the site. Care will be taken in the grading to establish low points close to the water table where willows, cottonwoods, and other material requiring water can survive.

Flat slopes will be maintained during the grading to minimize erosion during the regeneration period.

The initial stages of regeneration occurring during the first year will be the formation of low grasses. These will include Hawgeton, Cheat Grass, and White Top. During the second and third years the succession will include young Sage, Rabbit Brush, Blue Grass, Russian Olive, and Yarrow, to name a few. There, plants will regenerate in natural patterns to augment existing plant material that will be replaced upon the completion of grading.

WATER QUALITY

The existing quality of water in the Humboldt River is not adequate for water contact sports and to insure the survival of many varieties of sport fish. To counter the poor water quality in the river an off-channel lake is proposed. The lake should be separated from the river by at least 100 ft. to provide adequate filtration of river water into the lake. The water level in the lake can be expected to roughly conform to the river level. However, the lake water should have a significantly reduced coliform count.

In similar ponds both near the airport and to the east of the city, off-channel ponds below the ground water table have been successful in providing an adequate habitat for fish and relatively clean water. Apparently the ground water flow is minimal through these ponds, but the water appears

EXISTING VIEW OF THE HUMBOLDT FLOOD PLAIN IN THE AREA PROPOSED FOR A RECREATION LAKE

VIEW FROM THE SAME LOCATION SHOWING THE VISUAL EFFECTS FROM A POTENTIAL DEVELOPMENT PLAN FOR THE RECREATION LAKE clear, there is no excessive algae growth, and the fishing is good.

In the proposed pond some flushing can be expected to occur through the gravel bed and occasionally during the spring high water through flooding. This flushing action can be accented through proper grading design.

Segregation of Respective Areas of Financial Responsibility

The river front improvements suggested in this concept plan will require the combined involvement from both the City of Elko and the Railroad Relocation Project. The following discussion will outline the major areas of responsibility.

Railroad Relocation Project Responsibility

The project is responsible for the purchase of all land to which access is removed by the railroad. In addition the project is responsible for mitigating adverse impacts resulting from fill extraction or other construction operations.

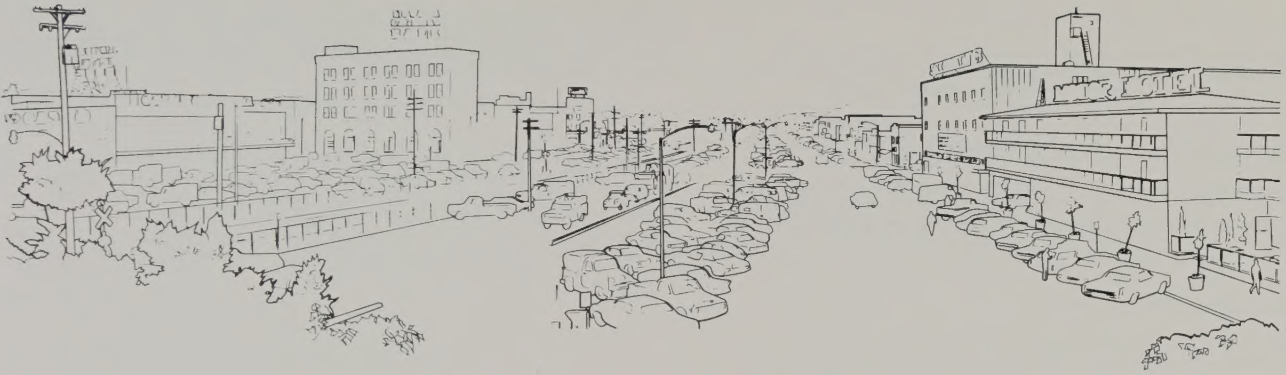
The project is responsible for all the grading of the proposed lake site and minimal landscaping to return the site to a natural condition. Concepts for minimal low maintenance landscaping are mentioned previously. Landscaping would be the responsibility of the project to implement. This will include removal and storage of overburden topsoil, and the replacement of topsoil on the regraded site.

The project will also be responsible for the replacement in kind of all existing parkland either taken by the railroad project right-of-way or which has its basic function and use altered by the right-of-way taking. In this case the softball diamond in the Southside Park will be taken in part in both North and South Bank alternatives. Therefore, a new site will have to be found. A vacant lot just west of Fifth Street Bridge is a possible site for the relocated ball park.

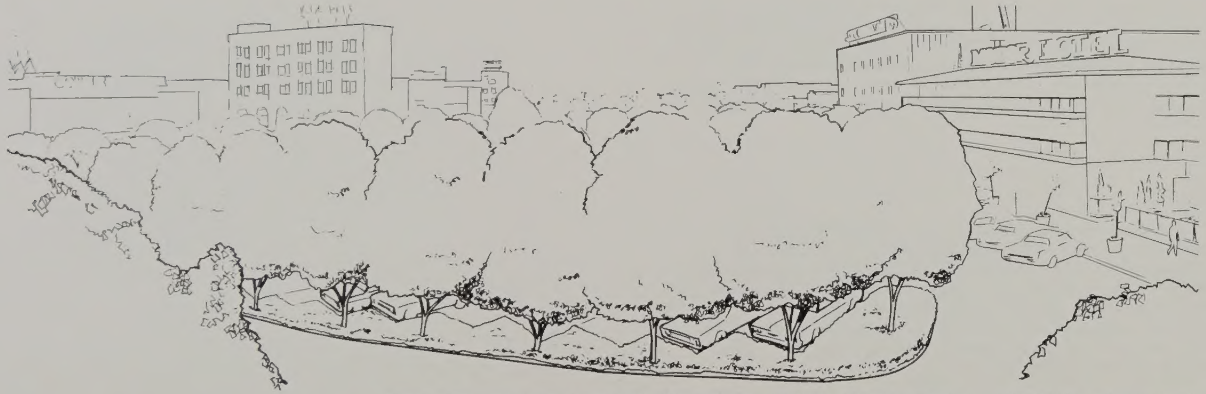
City of Elko Responsibility

The relocation project presents the City of Elko with a significant opportunity to establish a continuous open space linkage along the river. This land is presently in a flood plain and thereby not suitable for development. Public ownership of this area would allow the future development of a linear park extending from the proposed lake site to the open land east of town. The implementation of such a linear park will follow the existing Elko master plan proposal and provide an aesthetic amenity that will be increasingly appreciated as the city expands.

The establishment of such a linear park represents a significant benefit accruing to the City by the relocation project. At present little or no direct City investment will be required either for land acquisition or maintenance. The land need only be left in its present condition until there is need for its development.



EXISTING VIEW FROM THE POST OFFICE ROOF SHOWING THE SPACE BETWEEN THE STOCKMAN'S AND COMMERCIAL HOTELS



VIEW FROM THE SAME LOCATION SHOWING THE VISUAL EFFECTS FROM A POTENTIAL DESIGN PLAN

Part IV

Impact: Natural Environment

SECTION 12. TOPOGRAPHY, GEOLOGY & SOILS
13. WATER RESOURCES & FLOOD CONTROL
14. AIR QUALITY
15. NOISE IMPACT
16. VIBRATION
17. NATURAL VEGETATION
18. ANIMAL LIFE

Section 12

Topography, Geology and Soils*

GENERAL TOPOGRAPHY

The Humboldt River Subbasin lies within that portion of the Great Basin situated in north central Nevada. The area within this subbasin is a high, semi-arid plateau with numerous mountain ranges traversing a general north-south direction. These ranges are sometimes 100 miles in length and at elevations of 9,000 to 11,000 feet above sea level, and are separated by broad, flat valleys at elevations of 4,000 to 6,000 feet.

The most important topographic feature for the purposes of this report is the valley of the Humboldt River itself, which flows through the Elko Basin from the northeast to the southwest with a relatively flat gradient of approximately 5 feet per mile.

The Humboldt River Valley has always played an important role as a transportation route across Nevada. With the relatively flat grades found in the Valley facilitating the movement of vehicles, the Valley became the primary land transportation route to the gold rush country during the mid-1800's, and later on provided a natural route for the transcontinental railroad. The Valley was the favored route for early explorers, emigrants, and gold rush parties, beginning as early as 1829 and continuing until opening of the railroad.

LOCAL TOPOGRAPHY

The Humboldt River through down cutting and later deposition has built a narrow, nearly flat flood plain ranging from a quarter of a mile to three-quarters of a mile in width through the Elko Basin. In the process, the low ridges, or spurs, were truncated, and in many places well developed river terraces were formed.

The elevation of the river plain immediately southeast of Elko is about 5,025 feet. To the northwest, the even-crested River Range rises to an elevation of about 7,000 feet, with a few peaks reaching 7,400 feet. South of Elko, the summit of the Elko Range is approximately 6,200 feet, but rises to 7,000 feet about 10 miles to the northeast near the end of the range.

Through the developed part of the city the Humboldt River is confined within a single channel; both immediately east and west of the city, the valley floor is occupied by several channels and numerous meanders and sloughs.

The community originally developed just north of the River. The downtown area, and the existing railroad tracks have been built on fairly flat ground just a few blocks from the river. Crude levees protect the low lying areas from flooding. Until recently, most of the growth of the City took place in the area north of the river. This is an area of rolling topography on the edge of northwest to southeast trending hills. In some places, the difference in elevation between the existing railroad tracks, and developed areas on the northern fringes of Elko is as much as nearly 150 feet.

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* Based on "Environmental Considerations, Geology and Related Aspects," by J. J. Husband, Nevada State Highway Department (Appendix 1).

Much of the recent development in Elko, particularly mobile home development, has taken place south of the river. Here also some development has taken place in the floodplain protected by levees, but most is on the river terrace, and the adjacent foothills. The river terrace is a thin band hemmed in between the floodplain of the Humboldt and a series of rugged, narrow north-south trending ridges. Parts of this area south of the City rise over 100 feet above the level of the existing railroad tracks.

EFFECT OF TOPOGRAPHY ON RAILROAD LOCATION

The topography of the area has several important implications for the project. From a community planning viewpoint it could be judged desirable to relocate the main lines of the two railroads completely outside the community. However, to avoid disrupting existing development, any route north or south of the community would have to contend with abrupt changes in topography.

The existing railroad grade through Elko varies from .09 percent to 0.36 percent. The ruling grade for main line railroad operations through Nevada is 0.4 percent.

To achieve such a grade any route skirting the city would require expensive and environmentally damaging excavations having a maximum depth of 120 feet north of town and 110 feet south of town. An alternative would be tunneling, but this would be exorbitantly costly.

It follows that the only practical routes for railroad relocation lie in the corridor bounded by the existing foothills, that is, on the floor of the valley. Alternative locations are discussed in detail in another section.

GENERAL GEOLOGY

Intrusive igneous rocks and intermediate sediments underlie many of the mountain ranges in the northern part of the Humboldt River subbasin. Older Paleozoic formations predominate in the central and southern portions. The various mountain ranges are thought to be both Paleozoic granite formations and Mesozoic outcrops and caps combined with Tertiary lava flows. The subbasin lies between two massive granite intrusive thrusts. The satellites of the great Sierra Nevada Batholith, occurring in the late Jurassic period, extends into the southwest portion of this subbasin and the Paleozoic and Triassic sediments. Another area of intense folding and granitic thrusting, occurring in the late Jurassic period, extends into the southwest portion of this subbasin and the Paleozoic and Triassic sediments. Another area of intense folding and granitic thrusting, occurring in the Tertiary period, extends into the eastern portion of the subbasin.

Lava flows settled on the basin floors in the late Tertiary period. The Elko "Hot Hole," a very large hot spring in Elko, is remaining evidence of recent volcanic activity. In the Quaternary period, tilting and faulting of the mountain ranges and basins were accompanied by the deposition of deep limestones, clays, silts and alluvial fans.

The Elko Hot Hole
South of the Humboldt River

The rocks of the Elko area may be divided into three general groups: (1) the older rocks, Paleozoic limestones and quartzites which crop out in the River and Elko ranges; (2) Tertiary alluvial and lacustrine sediments with interbedded pyroclastic materials, which partially fill the basin between the two ranges; and, in addition, Tertiary lavas which in some parts of the area are interbedded with, or rest upon, the Tertiary alluvial and lacustrine deposits; (3) surficial Quaternary alluvial deposits which underlie the plain of the Humboldt River and the channels of its tributary drainage.

SOILS

Apart from north and south bypass alternatives, which are not studied in depth in this analysis, nearly all the right of way of the 3 major study alternatives lies exclusively within soils of the Humboldt flood plain. Flood plain soils are deep, are generally fine in texture, and have some localized alkali concentrations.

The flood plain soils contain economically significant deposits of sand and gravel. There are presently two active sand and gravel operations within the project area. Both are located along the Humboldt River. Within this area none of the various study alignments would adversely affect these economic resources, other than requiring reasonable access to the sand and gravel deposits.

The U.S. Soil Conservation Service has conducted a Reconnaissance Soil Survey in the Elko area, exclusive of the flood plain soils.

The City itself is located on predominantly sandy loam soils with a hard pan underneath. According to the Elko comprehensive plan:

"The City has a high water table at an average depth of five feet below the surface. This gives rise to ground water seepage problems in basements of buildings in the low section of the City, especially between the downtown area and the Humboldt River. In this area are found more porous soils, and high water in the Humboldt will temporarily raise the ground water level in these areas."

The ground water conditions would be of concern to any depressed-track alternative, and any significant track depression will have a definite but unpredictable effect on the ground water table.

SEISMIC ACTIVITY

According to the 1970 Edition of the Uniform Building Code, Elko is located in Seismic Risk Zone 2. However, as the City's plan indicates, the community is relatively close to two areas having a higher seismic risk which are designated as Risk Zone 3. "A severe earthquake occurring on the outer limits of either of the higher risk zones could cause extensive damage in an area such as Elko -- while epicenters in the Elko area are not numerous and past local earthquakes have not been severe, damage has occurred in Elko from earthquakes having epicenters as far away as Fallon."

The main implications of the remote possibility of seismic activity adversely affecting the project are related more to structures than to the track work itself. Any major structures -- overpasses and bridges, for example -- should conform to Seismic Zone 3 building design requirements.

CONCLUSIONS

The following conclusions regarding the railroad relocation project can be drawn from the foregoing review of geologic and soil conditions:

1. Soils in Elko are satisfactory for conventional types of engineering construction and for support of engineering structures.

2. Due to porous soils and ground water seepage, if a fully depressed trainway were excavated, keeping the trench dry would pose a serious problem.

3. Any railroad relocation must be confined to the floor of the existing Humboldt River Valley.

Section 13

Water Resources and Flood Control

Certain of the proposed track relocation plans would involve rechannelization of portions of the Humboldt River, and other alternative plans would cross local storm drainage channels. Changes in railroad operations or river channelization could affect the quality of surface waters of the upper Humboldt River Basin. Certain of the alternative plans could affect, or be affected by, the ground water table or underground water supplies.

This section discusses the hydrology of the Humboldt River, possible effects of upstream flood control reservoirs, local drainage conditions, historical floods experienced on the Humboldt River, design requirements and hydraulic capacities required for any river rechannelization, and matters related to underground water resources and water quality. The hydraulic design requirements for the channel would also effect the length and span arrangement of new or relocated bridges across the Humboldt River.

PHYSICAL DESCRIPTION OF THE HUMBOLDT RIVER SUBBASIN

The Humboldt River Subbasin lies within that portion of the Great Basin situated in north central Nevada. This subbasin is very irregular in shape due to the natural topographic conditions. It is bounded by the Snake River Basin, Great Salt Lake Basin, Central Region, Carson River Basin, West Central Region, and the Black Rock Desert Region. This subbasin drains an area of approximately 16,843 square miles. Portions of eight Nevada counties (Elko, White Pine, Eureka, Lander, Nye, Churchill, Pershing, and Humboldt) are included in this area.

The Humboldt River is the largest stream lying wholly within Nevada, and is the main watercourse line situated entirely within this subbasin. The river flows generally westward, rising at a point near Wells, Nevada, and emptying into the alkali flats some 300 miles westerly in the Humboldt Sink, near Lovelock. The actual channel length of the river is over 600 miles, with a general gradient varying five feet per mile in the Elko area to 2.5 feet per mile between Carlin and Lovelock. The essential subbasin flows are the result of snow melt.

In the vicinity of Elko, the Humboldt River courses through a trough-like basin between two roughly parallel elongated mountain masses, the River Range lying to the northwest, and the Elko Range lying to the southeast. The basin ranges in width from seven to nine miles with the lowest part of the basin lying near the base of the Elko Range.

FLOODING ON THE HUMBOLDT RIVER

The Humboldt River subbasin is characterized by low rainfall, extremes in temperature, high degree of evaporation and low degree of humidity. Precipitation increases from west to east with a high average annual precipitation of ten inches in the Elko area, and a low average of three to four inches in the Lovelock area. The precipitation level in addition to being low, is extremely variable. This variability has been confirmed by 100 years of records and study of lakes and tree growth. The pattern seems to be one of successive wet and dry periods rather than single wet and dry years. These periods seem to be between two and twenty years.

The Humboldt River depends on snowfall and spring runoff for its flow. This flow is reduced by an evaporation rate that varies from 40 inches in the Elko area to 58 inches in the lower terminal valleys.

The Humboldt River is fed mainly at its head with little additional flow entering in the lower reaches. Six main feeders (Mary's River, North Fork and Maggie Creek from the north, and Starr Creek, Lamoille Creek and South Fork from the south) furnish approximately 90 percent of the yearly runoff at Palisade, the point of greatest volume along the Humboldt River. Rock Creek from the north and Pine Creek from the south furnish a small essential runoff below Palisade. The Reese River, which joins the main stream of the Humboldt River near Battle Mountain has a large drainage area from the Shoshone Mountains, but contributes flow very infrequently. The other tributaries (Bishops Creek, Tabor Creek, Boulder Creek and Secret Creek near the headwaters, Susie Creek near Carlin, and Kelley Creek near Golconda) contribute little to the yearly runoff and cannot be considered as main feeders of the Humboldt River.

Surface water flows have been recorded for about 35 years. There are nine gauging stations on the Humboldt River main stream where data have been recorded for an extensive period. The Humboldt River at Palisade, where records have been maintained for an average of 63 years, shows a yearly discharge of approximately 257,000 acre feet. The highest value recorded at Palisade was 6,610 cfs in February of 1962. Periods of extremely low flow are common at all gauging stations. Records indicate that during the late summer and early fall the small streams have no flow and the Humboldt River minimum has been as low as 1.0 cfs.

The Humboldt River through Elko exhibits these same wide variations in flow, both within a single year, and between peaks of different years, as shown in Table 13-1. In this area the river has an average flow of 225 cfs. Maximum and minimum discharges are 7,070 cfs and 0 cfs, respectively, the latter occurring when the riverbed is completely dry.

Two types of classifiable conditions peculiar to the Humboldt River subbasin, wet-mantle and dry-mantle, are responsible for these flow variations and the flooding that often subsequently results. A wet-mantle flood results from the saturation of the soil mantle to the point of overland flow. This condition is caused by extended periods of warm winter rain, rain on snow or frozen ground during the winter, or rapid melting of abnormal snow accumulations during the spring.

Dry-mantle flooding occurs primarily during the summer. It results from short periods of intense rainfall from summer thunderstorms on dry soils with thin or depleted vegetative cover. The soil mantle is only super-

Table 13-1

HUMBOLDT RIVER PEAK VOLUME OF FLOW THROUGH ELKO* 1952-1972

Year	Maximum Flow (c.f.s.)	Date of Peak Flow
1952	3,860	April 30
1953	1,020	June 9
1954	337	March 12
1955	414	June 18
1956	2,180	May 30
1957	2,250	June 12
1958	1,620	May 28
1959	142	March 3
1960	453	June 11
1961	309	June 4
1962**	7,070	Feb. 13
1963	1,910	June 7
1964	2,220	June 19
1965	1,670	June 18
1966	930	March 17
1967	1,760	June 23
1968	1,010	June 9
1969	2,840	April 7
1970	2,430	June 12
1971	2,430	May 24
1972	1,660	June 11

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* The actual figures given are for the gauging station on the Humboldt 10 miles east of Elko. As there are no significant tributaries between the gauging station and Elko, the flow at Elko would be generally somewhat less than the figures shown. There is no continuous monitoring of river flow at Elko itself.

** The actual peak flow through Elko on February 13, 1962 was 6250 cfs. The difference of 820 c.f.s. from that shown in the table was due to the fact that between the gauging station and the 5th Street bridge at Elko, much of the water spread over intervening flat land.

Source: Compilation of Records of Surface Waters of the U.S., Part 10, United States Geological Survey, The Great Basin, pp. 368-69.

ficially wetted by the heavy rainfall, but the rainfall intensity is such that most of it runs off. The dry-mantle type occurs less frequently along the Humboldt, usually being confined to stream sources on the higher watershed, although it can cause severe localized damage downstream.

Flooding History Including Damage Estimate

The Elko reach of the Humboldt River has been subjected to many periods of flooding. Both flood types (wet-mantle and dry-mantle) have been destructive in terms of flooding, erosion, and sediment damage. Extensive damage and flooding from dry-mantle conditions have been more prevalent on the lower reaches than in the Elko area. For the Elko area itself, historical data from critical flood years has been summarized from a document entitled "Water and Related Land Resources, Special Report, Humboldt River Basin, Chronology of Flood Years and High-Water Years," a cooperative survey by Nevada Department of Conservation and Natural Resources and the U.S. Department of Agriculture, June 1962. (The complete summary appears in Appendix 2.)

Table 13-2 presents monetary estimates of flood damages which occurred in selected years of relative damage. These estimates were compiled by the U.S. Corps of Engineers and are contained in a letter from the USED to the consultant.

Flooding From Local Watershed

A major source of flood damage to the City of Elko and its immediate environs, in addition to the Humboldt River itself, has been the local Elko watershed. It is situated between the crest of the Adobe Range and the Elko Mountains and includes all but a small portion of the City of Elko. U.S. Highway 40, Nevada State Highways 11 and 46, the Southern Pacific and Western Pacific Railroads, and the Humboldt River traverse the watershed.

With the exception of one small, steeply sloping drainage on the south side of the Humboldt River, all of the drainages in the watershed lie northwest of the river and drain southeast. Principal drainages northwest of the river are, from east to west, Kittridge Creek, Manzanita Wash , Eight Mile and East Adobe Creeks head in the highlands, while the other two drainages head in the uplands. The small drainage located south of the river drains north and is referred to as South Side Wash.

Except for Kittridge Creek, immediately below the springs in Kittridge Canyon, the Humboldt River is the only perennial stream in the watershed. The watershed yields water as streamflow only during and following thunderstorms or periods of melting snow. Only during these periods of high runoff do they discharge into the Humboldt River.

The major floods of August 1961 and February 1962 caused direct floodwater damages in the Fifth Street Wash, Eight Mile Creek, an area flooded by both Fifth Street Wash and Eight Mile Creek, South Side Wash and the Kittridge Creek area. As a result of these floods, the City of Elko was required to remove about 650 cu. yds. of sediment from the City streets. Rapid runoff from upland and highland slopes along these drainages resulted in extensive floodwater, sediment, and minor erosion damage to residential and commercial properties, streets, culverts, railroads, and some agricultural land.

Existing and Proposed Flood Control Structures

Maximum flood flows on the Humboldt River and its tributaries at, and upstream from, Elko are affected by a) small structures on tributaries within the local watershed, b) existing reservoirs on upstream tributaries, and c) additional proposed reservoirs on upstream tributaries. Existing

Table 13-2

ESTIMATED DAMAGES*

Flood Year	Elko and Immediate Area	Reach 2**	Total Humboldt River
1910	(Not Available)	(Not Available)	$ 1,000,000+
1943	$ 19,000	$ 68,500	$ 711,000
1945	(Not Available)	$ 65,000	$ 700,000
1952	$ 7,000	$ 89,400	$ 1,623,000
1962	$ 12,000	$ 187,000	$ 1,185,000

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* Based on price level and development at time of flood.

** Includes Elko and that portion of the Humboldt River main stem between its north and south forks.

Source: Letter from George C. Weddell, Chief, Engineering Division, U.S. Corps of Engineers, Sacramento, Ca. June 28, 1974.

or proposed flood control reservoirs on the Humboldt River downstream from Elko, or on downstream tributaries, do not affect flood flows in Elko itself and are excluded from this discussion.

Recently the U.S. Soil Conservation Service has constructed three small local floodwater retarding structures to reduce floodwater and sediment damage within the City of Elko. These are the South Side Wash, Fifth Street Wash, and Eight Mile Creek Retarding Dams, including reservoirs and drainage structures. All are designed to the floodwater capacity and sediment storage necessitated by the 100 year storm. The one existing tributary control dam upstream from Elko is Metropolis Reservoir.

Metropolis Reservoir is located about 10 miles north of Wells, on Bishop Creek. The design capacity of this unit was 30,000 acre feet at a depth of 70 feet. Presently this dam is considered unsafe and can only be filled to about 20,000 acre-feet at a depth of 55 feet.

Metropolis Dam was constructed as a flood control and irrigation structure for areas near Wells, and is subject to extreme water level fluctuations, sedimentation, and temperatures.

The Corps of Engineers is currently studying the possibility of constructing two dams upstream from Elko on major tributaries to the Humboldt River main stream that would have effects on flood flows in the Elko area. The first is the Vista Dam and Reservoir. It would be located about 41 miles northeast of Elko on Mary's River and would retain the runoff from a 415 square mile drainage area. The second, Devils Gate Dam and Reservoir, would be constructed on the North Fork of the Humboldt River about 18 miles northeast of Elko. Runoff would be retained from a drainage area of 880 square miles.

In addition to these dams, the Kittridge Creek reservoir, a portion of the Soil Conservation Service projects previously mentioned, which was never constructed, is still under consideration. This multiple purpose dam would be located about four miles upstream from where Kittridge Creek crosses U.S. Highway 40, or about five miles north of Elko. It would provide floodwater and sediment storage capacity for the 100 year storm.

The accompnaying photographs show the levees constructed in 1942 and 1948-49 along the Humboldt. Exhibit 13-1 shows the existing flood hazard area in relation to the various alternative railroad alignments. The flood hazard area in the City is that indicated on 1974 U.S. Department of Housing and Urban Development maps for eligibility for Federally assisted flood insurance. Outside the City the area shown as a flood hazard area is less precise and is adapted from more general U.S.G.S. maps of flood-prone areas.

Humboldt River Channel Hydraulic Design Criteria

It is evident from the historical flood and discharge data that the section of the Humboldt River through Elko is subject to extreme flow variations. Two of the most promising track relocation plans involve rechannelization of portions of the river and the construction of bridges across it. For purposes of preliminary evaluation of the required channel and bridges, a maximum flood flow of 7,000 cubic feet per second has been assumed. This corresponds to the maximum peak flow recorded at the Ryndon gauging station ten miles upstream from Elko on February 13, 1962, and appears to be consistent with recommendations of the U.S. Corps of Engineers.

All alternatives which significantly encroach on a designated flood plain shall be evaluated in accordance with Executive Order 11296 and Flood Hazard Evaluation Guidelines for Federal Executive Agencies.

The effect, if any, on maximum flood flows of the two proposed upstream storage reservoirs, Devils Gate Reservoir and Vista Reservoir, previously described, on maximum flood flows has been explored.

The drainage area of the upper Humboldt River Basin above Elko. computed by scaling maps, is approximately 3200 square miles. The drainage area which will be controlled or regulated by the Devils Gate and Vista Dams totals over 1250 square miles, or about 40 percent of the entire area.

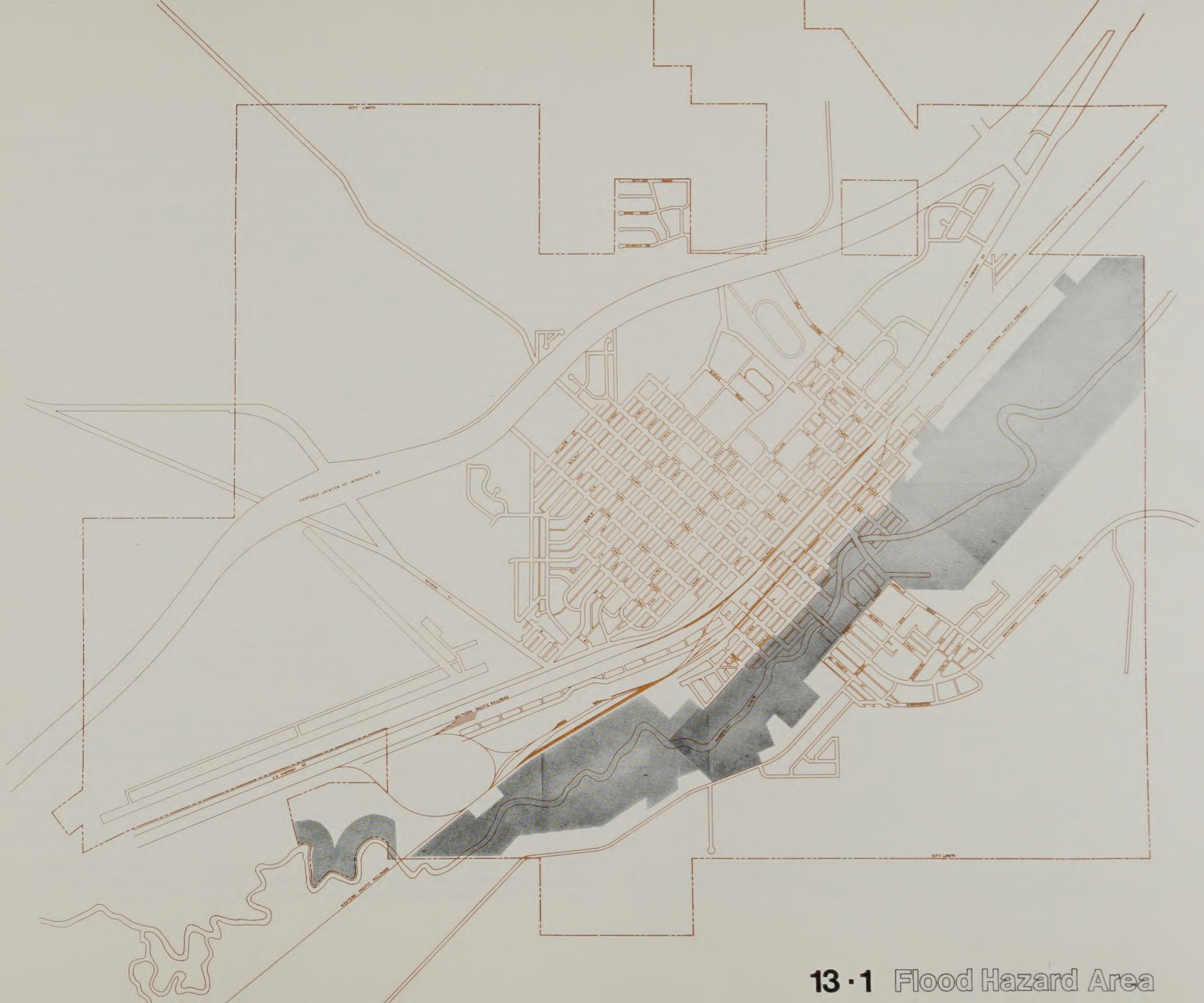
There is no direct relationship between drainage areas, runoff and flood flows. To determine the effect of the dams on flood flow volumes, it would be necessary to perform studies involving rainfall intensities and concentration time. Without this information, only a conservative estimate can be made regarding the effect of the dams. We tentatively would suggest a 20 percent reduction, but with the knowledge that the actual reduction could reach 60 percent or more.

Since the present design capacity for the river channel at Elko is 7,000 c.f.s., the effect of the upstream dams, if built, could reduce the design capacity to 5,600 c.f.s.

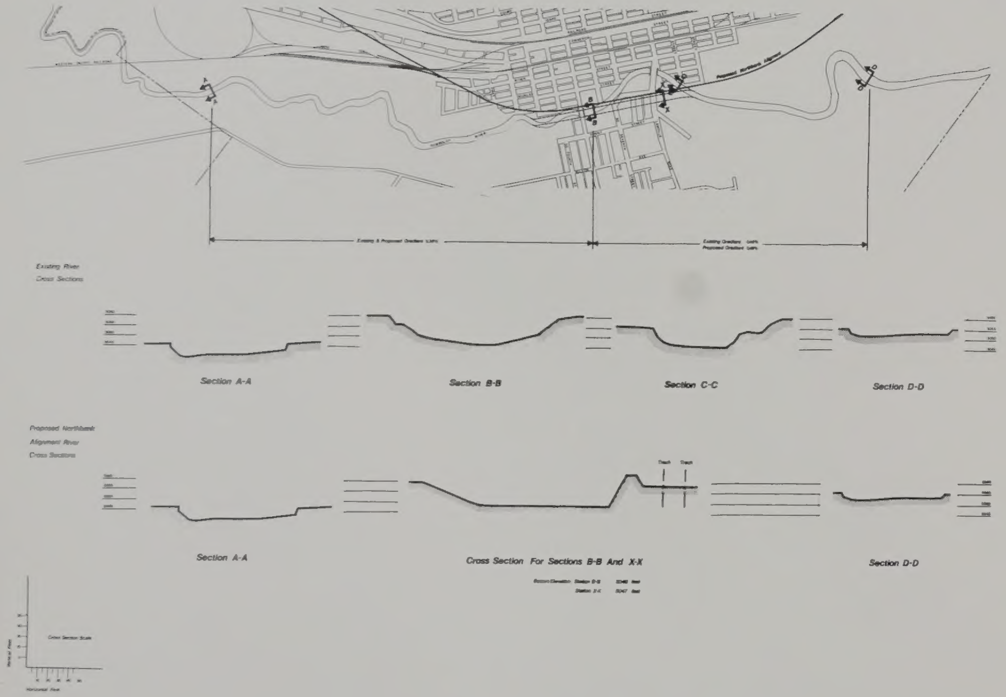
However, since no funds have been appropriated for the two upstream reservoirs, and there is no assurance that the dams will in fact be constructed, the required channel capacity and bridge lengths in this report assume unregulated conditions, that is, a maximum flood flow of 7,000 c.f.s.

For preliminary planning purposes, the tentative recommended cross-sectional area for the river channel and floodway through Elko would be as shown on Exhibit 13-2. The floodway consists of an area equivalent to the present channel, plus an overflow area on either the north or south bank, depending on the route selected for the relocated railroad corridor.

Although certain of the track relocation plans would eliminate meanders and thereby slightly steepen the gradient of the River, the effect is considered to be negligible insofar as any detrimental scouring, either upstream or downstream, is concerned.



13 · 1 Flood Hazard Area


Existing River Cross Sections
Section A-A
Section B-B
Section C-C
Section D-D
Proposed Northbank Alignment River Cross Sections
Section A-A
Cross Section For Sections B-B And X-X
Section D-D

13·2 Existing and Proposed River Cross Sections

Determination Of Safe Elevation Above Flood Stage For Design

The lack of detailed photogrammetric topographic information of the Elko area in the vicinity of the proposed river rechannelization makes it difficult to establish a precise elevation that will be safely above the flood stage. For preliminary planning purposes, the level of the top of the dirt levee on the north side of the Humboldt River at Fifth Street is taken as an empirically proven average elevation that would afford a freeboard of about 5.0 feet above maximum flood stage. A recent instrument field survey indicates Elev. 5,060 feet for this point.

The river would be straightened to parallel the railroad. A maximum water depth of ten feet would require a channel width of 112 feet. The water elevation would be at or below the evaluation of the adjacent property and flooding problems would be alleviated.

An alternative version of this would reduce the size of the channel and allow for infrequent flooding of the adjacent property when near-maximum floods occur. A dike along the north side of the river would reduce the hazard of flooding to the railroad and property along the north side of the river. In other respects the alternative would be similar to the channel as described.

DOMESTIC WATER SUPPLY

Use of water supply from the Humboldt River Subbasin is primarily agricultural. No water is drawn from the Humboldt River or it's tributaries for domestic use, and the only industrial use is in connection with concrete sand and gravel processing plants. Domestic water supply for Elko and upstream communities and isolated ranches in the Humboldt River Valley is obtained from springs and underground aquifiers.

Ground water occurs in the majority of the valleys throughout the subbasin. The upper sands and gravels are the principal aquifiers. These upper soils are porous and permeable, allowing recharge of ground water deposits by precolation of irrigation water, infiltration of surface water, and direct precipitation on the valley floor.

Ground water is obtained from shallow wells in the Quaternary alluvial deposits, but the yield of individual wells is not large. The geologic formations from which these underground water supplies are obtained are discussed further in Section 12.

Downstream water users also obtain domestic supply from wells. The underground aquifiers are usually considered to be recharged in part by stream flows in the Humboldt River.

During the high river stage, there is percolation into the ground water table. In many years there is no surface flow during the late fall and winter, but there are some indications of underground flow, in which case infiltration would still occur.

WATER QUALITY

Influence of Alkali in the Great Basin on Water Quality

Water quality in the Humboldt River is influenced in part by the widespread alkali conditions in the arid Great Basin. A low level of rainfall in upland areas and high evaporation rates result in the accumulation of alkali salts in the topsoil. Early rail travelers complained of swirling clouds of alkali dust when they disembarked for meal stops at Elko in the early 1870's. Rainfall is insufficient to leach out the salts except on alluvial plains. The predominant salts, calcium or sodium carbonate or bicarbonates, are present in the upland areas, and can be exposed by heavy construction operations. These salts move downstream, where they evaporate and accumulate in vast quantities in the Humboldt Sink, Carson Sink, and other salt flats characteristic of the Great Basin.

The presence of alkali in surface waters is a recurrent situation, but the amount of leaching and the concentration of alkali in runoff from rainfall does not significantly degrade water in the Humboldt River or make it unfit for downstream users. In areas where irrigation has been practiced for some years, the alkali has largely been leached out of the soil.

Waste Discharges Into The Humboldt

The addition of any waste material into a natural watercourse changes its chemical and bacterial composition and is thereby damaging to the stream. Although the municipalities of Wells, Elko, Carlin, Battle Mountain and Winnemucca discharge sewage effluent into the Humboldt River, either directly or indirectly, damage to the watercourse from sewage treatment plant discharges has not been determined.

The State Water Quality Management Plan for the Humboldt River Subbasin states that the major source of pollutants is from irrigation waters returning to the Humboldt, rather than effluents from municipal sewage treatment plants.

Any damage which might be occurring does not seem to be significant when the indicated uses of the river are considered. There is no major industrial use made of this water. There are no domestic water intakes downstream from any of the municipal sewage outlets. There seems to be no ill effect from that portion of the water used for watering of livestock. Irrigation water is used primarily for flooding of bottom pastureland and areas of wild hay.

Elko Sewage Treatment Plant and Effluent

Elko's municipal sewage treatment and sewage collection system was the subject of a detailed study in 1968. More complete information concerning the waste treatment facilities can be found in that report.*

In summary, the City of Elko has separate systems for collection and conveyance of storm water, which is discharged directly into the Humboldt River, and for sanitary sewage, which is conveyed to a treatment plant situated westerly of the Western Pacific yard and south of the airport. The sewage flows receive primary and secondary treatment through a combination of mechanical facilities and large oxidation ponds. After detention and oxidation in the ponds, effluent is discharged into the meandering area of the Humboldt River.

Continuity of flow through these meanders is not regarded as essential to the continued successful operation of the sewage treatment plant and oxidation ponds. However, the yard relocation plans which involve westerly extension and partial rechannelization of the river contemplate hydraulic structures as necessary to assure near normal low water flow through the meanders and past the treatment plant to provide some dilution of the sewage effluent.

The water quality testing program described elsewhere in this Section disclosed certain deficiencies in connection with operation of the sewage treatment plant, with resultant degrading of the quality of the river water. Corrective measures are being taken, and under normal conditions the plant does have the capability to discharge a fully treated effluent. At times during the dry season, the larger portion of the river flow downstream from the treatment plant is effluent and not original stream flow.

A considerable quantity of the effluent from the treatment plant is diverted by a local rancher for irrigation, with return flow from the irrigated fields then being discharged into the river.

Water Quality Testing

Surface flow on the Humboldt River is designated as Class C by the State of Nevada, Bureau of Environmental Health. This classification includes waters or portions thereof which are subject to runoff from areas of moderate to urban human habitation, moderate industrial development, intensive agricultural development and where the watershed is considerably altered by man's activity. Class C waters are not considered suitable for bodily contact. (See Table 13-3) This is primarily due to the coliform content. However, with treatment and chlorination, the water would be suitable for bodily contact.

The pH of the river is basic, which is due to the presence of calcium bicarbonate -- the predominant alkali. This alkali content is typical

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*Elko, Nevada -- A Report on Water and Sewage Master Plan, April 1968, prepared by Kennedy Engineers and Chilton Engineering.

TABLE 13-3

STATE OF NEVADA QUALITY STANDARDS
FOR CLASS C WATERS

Item	Specifications
1. Floating solids, settleable solids; sludge deposits.	Only such amounts attributable to the activities of man which will not make the receiving waters injurious to fish or wildlife or impair the waters for any beneficial use established for this class.
2. Sewage, industrial wastes, or other wastes.	None which are not effectively treated to the satisfaction of the Commission.
3. Critical materials; oils; deleterious substances; colored or other wastes; or heated or cooled liquids.	Only such amounts as will not render the receiving waters injurious to fish and wildlife or impair the waters for any beneficial use established for this class.
4. pH	Range between 6.5 to 8.5.
5. Dissolved oxygen	For trout waters not less than 6.0 parts per million; for non-trout waters not less than 5.0 parts per million.
6. Temperature	Shall not exceed 20°C for trout waters or 34°C for non-trout waters. Allowable temperature increase above normal receiving water temperature - 3°C.
7. Fecal coliform	The more stringent of the following apply: (a) Fecal coliform concentration shall not exceed a geometric mean of 1000 per 100 milliliters nor shall more than 20% of total sample exceed 2400 per 100 milliliters: (b) Annual geometric mean of fecal coliform concentration shall not exceed that characteristic of natural conditions by more than 200 per 100 milliliters nor shall the number of fecal coliform in a single sample exceed that characteristic of natural conditions by more than 400 per 100 milliliters. (c) Fecal coliform concentration, based on a minimum of 5 samples during any 30 day period, shall not exceed a geometric mean of 200 per 100 milliliters, nor shall more than 10% of total samples during any 30-day period exceed 400 per 100 milliliters. This is applicable only to those waters used for primary contract recreation.
8. Total Phosphates	Shall not exceed 1.0 mg/l.
9. Total Dissolved Solids	Shall not exceed 500 mg/l or one-third above that characteristic of natural conditions (whichever is less)

of rivers in the Great Basin, and there is no practical method of neutralizing the pH other than by chemical treatment.

As a part of the studies involved in this environmental impact analysis, a program of field testing and analysis of existing chemical quality and variations in quality of surface waters in the Humboldt River was initiated in April 1974, a time of peak flow on the river. Samples were collected twice weekly. Sample points were selected within the limits of the railroad consolidation project, extending from the gravel pit area on the east of the City to the Elko sewage treatment plant. These sample points are spread over 3.9 miles of river channel.

Sampling points were selected at those points which would have the most pronounced influence on river quality characteristics. Stations selected were in the downtown area of Elko and the point of confluence at the Hot Hole. Samples were then collected at various points upstream and downstream from these locations. Test data from sample points at the gravel pit east of Elko, 50 feet downstream from the point of confluence at the Hot Hole and 100 feet upstream from the discharge point of the sewage treatment, have been analyzed.

The following tests were selected to establish a base line on the river and to test according to the State Health Department Classification of Rivers.

The tests are grouped in order to show their effectiveness on the quality of the river water.

Nutrients = Ammonia and phosphates

Organic = Biochemical oxygen demand

Solids = Suspended solids, total solids and turbidity

Chemical = Sulfate, Chlorides, Alkalinity, pH, Dissolved oxygen, Temperature

Bacteria = (This testing was not started until June, 1974. At this time the data is incomplete.)

The tests revealed a range of values over the sampling period summarized in Table 13-4.

This sampling, conducted during high flow volume, showed no appreciable differences between sample points. Due to the high volume, the 1.4 cfs influent from the Hot Hole was diluted to such an extent as to have no effect on water quality. To illustrate, water entering the river from the Hot Hole is discharged at 112°D, with a high sulfate value of over 150 mg/L, and a high alkalinity above 390 mg/L. Samples collected 50 feet downstream were comparable to those taken above the point of confluence.

The tests also indicated that during high flow periods, the river meets the specifications for State of Nevada Class "C" water. It should also be noted that the solids were moderately high (total solids 450 mg/L, suspended solids 130 mg/L, turbidity 100 JTU). These solids were mostly inorganic and were due to runoff and high velocity (3.5 FPS).

Future Testing

This testing program will continue to establish a one year test record as a minimum base line for future analysis as the project continues. Additional sample points will be selected if deemed necessary. Night and bottom samples will be obtained and other tests will be run to satisfy requirements and questions which may arise in the field. Bacteria testing and identification is currently in progress.

Effect Of Variations Of River Flow On Water Quality

The Humboldt River through Elko exhibits wide variations in flow, both seasonally within a single year, and between peaks of different years. It is, therefore, difficult to describe "normal" conditions, but water management experts have suggested that variations in flow from an average high level of 965 cfs to a low of seven cfs would reflect conditions during an "average" year.

Table 13-4

Water Quality Tests		Range of Values April and May, 1974
pH		7.1 - 8.3
D. O. mg/L		4.0 - 9.0
BOD mg/L		0.3 - 2.3
Chlorides mg/L		10 - 22
Total Dissolved Solids mg/L		196 - 680
Alkalinity (above 8.2 pH)		0
Bicarbonate mg/L		110 - 375
Carbonate mg/L		-
Sulfate mg/L		33 - 40
Suspended Solids mg/L		82 - 226
Phosphates mg/L		.07- .24
Ammonia mg/L		.001 .009
Coliform	Total =	460 - 11000
	Fecal =	32 - 90
Turbidity JTU		60 - 157
Current Velocity, feet per sec.		1.7 - 3.9

During periods of very low flow in the Humboldt River, the satisfactory disposal of sewage effluent which has not been fully treated to this water course would become difficult, if not impossible. It is reasonable to expect that low water flows will exhibit higher concentrations of minerals and bacteria count than the high water flows for which results are now available, but this point needs to be confirmed.

It may be useful to consider the potential effect of the two proposed upstream storage reservoirs described in an earlier section. These reservoirs, when constructed, will tend to maintain more uniform stream flow conditions and should improve water quality through the study area.

River Rechannelization And Potential Silt Problems During Construction

The three most promising railroad relocations plans studied in this report would all require some rechannelization of the Humboldt River. The rechannelization work involves, in brief, excavation of new channels and the diversion of existing river flows to these new channels. In some instances the existing channels would be backfilled. From the environmental standpoint, such excavation and rechannelization work could increase turbidity in the river, increase sediment load, and under extreme conditions cause a silt problem, with detrimental effects on downstream channels and fish life. Such effects would be noticeable only during the period of construction and for a short time thereafter, after which river conditions would become stabilized.

For thousands of years the Humboldt River has meandered across its flood plain, periodically cutting new channels and filling old ones. Thus the proposed rechannelization is by no means an unusual or unnatural event in the overall history of the river or one that would not otherwise occur from natural causes.

The degree to which turbidity and siltation problems will be evident depends less on the inherent nature of the rechannelization work than on the precautionary measures and care taken during construction to minimize erosion and turbidity. These techniques will be discussed under the "Mitigation" of this section.

Potential Effects Of Expansion Of Western Pacific Yard Operations On Water Quality

At the present time, with only one switch engine regularly assigned to Elko, and with only an occasional group of road locomotives to be serviced, there is very little hazard of degradation of surface or underground water supplies from railroad operations. However, under the expanded yard classification operations proposed by Western Pacific, under which the Elko yard will terminate eastbound train movements originating in California and originate trains destined for Salt Lake City, there will be an increased level of locomotive maintenance, servicing and other related railroad activities.

This section will first consider the effect of possible yard expansion or relocation on surface flows in the river, on local runoff, and activities in the yard as they relate to infiltration of untreated waters or precipitation into the ground. Activities in railroad yards generate liquid and solid industrial wastes which require biological and/or chemical treatment prior to return to the surface channels or ground water basin.

- Existing Yard "On Site" Surface Drainage Characteristics. Existing local drainage flowing from the north towards the Humboldt River is concentrated into channels which pass under the existing yard through open channels, ditches and culverts. These drainage culverts will be extended as necessary under any additional tracks.

  The Humboldt River passes under the Western Pacific main line westerly of the present yard limits. This channel will remain but will be converted to a culvert of reduced hydraulic capacity. The proposed westerly extension of the yard will cross over this culvert, and a new railroad bridge across the Humboldt River will be built about one-half mile westerly.

- Ground Water Percolation. It is expected that the large areas of new ballast in the expanded yard will permit rainfall to percolate more quickly or to be carried to local drainage collection facilities rather than evaporating. The net effect of converting approximately 45 acres of wetland and open range to railroad yard might also serve to reduce evaporation. On the other hand, the increased amount of switching could increase the hazard of spillage or discharge of a spillage or discharge of a Waterbone pollutant resulting from derailment of a freight car containing chemical lading.

- Locomotive Fueling Rack. The present fueling rack is located adjacent to the diesel engine house. For either the remodeled yard facility, or for an entirely new yard, it is expected that the present fueling rack will be relocated to one or more locations near the ends of the inspection tracks, so that diesel locomotives can be refueled without the need to break trains. Reinforced concrete pads at the new racks would collect and retain any oil drippings or fuel spills. Presently such oil wastes are conveyed first to a gravity separation pit, and thence to an evaporation basin on Western Pacific property.

  It is anticipated that the oil wastes from the relocated racks will be disposed of in a similar manner, and in any event will not be discharged into the City's sewer system or into the River.

- Wash Racks for Railroad Rolling Stock. Wash facilities involving detergents may be constructed to remove dirt and grime from railroad rolling stock.

  It is anticipated that these wash racks would include a water recycling plant. A minor increase in the net comsumptive use of domestic water for this function may be expected. The detergents would be recycled.

- Disposal of Radiator Water from Diesel Locomotives. When major repairs are performed on diesel engines, it is necessary to drain the radiator and the engine block. The cooling water ordinarily contains biologically active compounds of chromate, hexavalent chromium (Cr^{+6}), a radiator rust inhibitor.

  However, the major overhaul shop for Western Pacific motive power is located at Stockton, California. Only on rare occasions would the engine or radiator be drained at another yard. Consequently, disposal of radiator rust inhibitor compounds is not expected to be a problem at Elko.

- Sanitary Wastes from Locomotives and Cabooses. For over a century it was the common practice for human waste to be dumped from passenger and freight trains onto the roadbed. The discharge of such wastes is being phased out, with all such dumping to be ended by the mid-1970's.

  Human waste on Western Pacific locomotives and cabooses is disposed of using:

  (a) Incinolet electric hoppers, and
  (b) Microphor Biological Tertiary Treatment (redwood filter and chlorine).

  These two types of toilet facilities are either now in use or are being installed on Western Pacific equipment. In either case, the nature of the equipment is such that holding tanks requiring the discharge of sanitary wastes into the City of Elko's sewage system are not used. Such wastes as may be discharged will be in the form of ash or biologically inactive liquids.

  Southern Pacific rolling stock is equipped with similar on-board disposal devices.

- Sanitary Wastes Generated at On-Site Facilities. The toilets and other sanitary facilities, housed in various buildings or work sites throughout the existing yard, are connected to the City's sanitary sewer system. The total volume of sewage originating from these sources is not expected to change significantly, beyond that contributed by a nominal number of additional employees.

  In the event the yard is relocated to the alternative site about four miles east of Elko, construction of a new sewage collection system and treatment plant to handle yard wastes will be required.

- Consumptive Use of Water Resources. Because of silt problems, the use of water meters was discontinued several years ago by the City Water Department. However, measurements made prior to that time did not indicate that the Western Pacific yard was a major user of water. Since the classification of railroad freight cars is not a water-intensive activity, this situation is not expected to change. Therefore, water use by Western Pacific will remain relatively insignificant as compared with the total municipal demand.

- Cleaning Track. Timber dunnage, scrap lumber, steel strapping, and other miscellaneous debris is dumped alongside the existing cleaning track. The amount of such materials so disposed of in a railroad yard today is minimal, due to ICC decisions which make shippers responsible for cleaning out cars after unloading, but some clean-out by railroad forces is still required.

CONCLUSIONS

The following conclusions can be drawn regarding the railroad consolidation project, as it relates to surface and underground water resources. The railroad consolidation project, yard modifications, and related work discussed in this report have certain common features, including rechannelization of the Humboldt River west of town and south of the sewage treatment ponds, removal and replacement of existing bridges at Fifth Street and Ninth Street (or Twelfth Street), rechannelization between Sixth and Tenth Streets, and provision of a flood overflow area along the river rechannelization. Not all of these features are common to or apply to each of the three track relocation plans discussed in detail in this report.

The effects on water resources and flood and water quality conditions are expected to be as follows:

- The river rechannelizations at the west end of town will eliminate almost one mile of meanders, providing a shorter and more direct route for flood flows, and thus should materially relieve upstream flooding conditions. The effect on fish and wildlife is discussed in Section 18.
- The existing Western Pacific railroad bridge south of the sewage treatment plant has been reported to be a bottleneck, causing obstruction to the waterway from drift and ice jams. Its replacement with a new structure providing a more adequate waterway and located on a more favorable skew should tend to alleviate flooding problems.
- The Fifth Street bridge has a restricted waterway capacity. During floods there is an appreciable head loss at this structure. Its replacement with a more adequate waterway would alleviate upstream flooding conditions and lower backwater levels.
- Straightening of the bend of the river between Sixth and Tenth Streets may offer relatively minor relief to flooding. This reach of the river is not considered deficient in hydraulic capacity.
- The existing Ninth Street bridge does not appear to constitute a restriction to channel flow, and its replacement would have a negligible effect on flooding conditions.
- Almost all of the improved residential and commercial properties needed for the project are located in areas susceptible to flooding. Their acquisition, demolition and/or removal as a part of the proposed project will eliminate the hazard of future flood damage to these parcels.
- Any proposed railroad embankment along either the north bank or the south bank of the Humboldt River would constitute a strong levee of solid, well-compacted construction, thus providing an almost positive guarantee against future levee breaks or levee overtopping from floods on the main stream of the river. The railroad embankment would replace the existing levees which were hurriedly erected following the 1942 floods.
- The railroad embankment could conceivably act as a barrier with respect to flows originating in the local watershed area and which are conveyed to the river by the local drainage channels at Fifth Street Wash and Eight Mile Creek. Openings of adequate hydraulic capacity would be needed through the railroad embankment for these channels.
- Historical records indicate that the Humboldt River has spilled over its banks, with widespread flooding in the downtown area extending into the Western Pacific classification yard. It is believed that this flooding has been aggravated by the very flat slope of the river and by channel restrictions resulting from siltation from old irrigation dams west of town. These dams were removed many years ago.
- However, due to the flat slope of the river, and backwater conditions caused by meanders and channel conditions outside the limits of the railroad relocation project, it would be inaccurate to expect that the proposed track consolidation and river rechannelization project will eliminate future flood problems in Elko. Rather, the effect will be to lower the flood crest slightly and, in the case of relocation plans involving railroad embankments along either bank of the river, afford maximum protection against levee failure or overtopping.
- Although two proposed stream irrigation and flood control reservoirs are not a part of the railroad grade spearation and track consolidation project herein described, the effect of such reservoirs would be to lower flood crests through Elko, maintain more uniform conditions of year-round flow in the river, and probably enhance water quality. The beneficial effects of the upstream reservoirs on maximum and minimum river flows would tend to complement the rechannelization and bank strengthening of the river associated with the track consolidation project.
- The alternative plans that would involve a deep cut for track depression along Silver Street, or the Northern or Southern Bypass, each of which would involve deep cuts, could be detrimental to the ground water table and underground water resources. The other alternative plans, which do not involve deep excavations, will have little or no effect on under-ground water resources.

The quality of water or the areas of stream bed used for support of fish or other aquatic life, and for aquatic plants, will not be adversely affected to any significant degree by any of the track relocation or river rechannelization proposals.

- Extension of the WP yard and railroad classification activities by the Western Pacific are expected to impose only a negligible increase on the demand for domestic water or domestic sewage treatment. Discharges from the yard will be treated in the existing City sewage treatment facilities, and there is no indication that these discharges would degrade water quality in the Humboldt River. Irrespective of whether the existing WP yard is extended and enlarged, or a new yard is built, the type of discharges will be identical -- the only difference is that WP would have to build new treatment works for a new yard east of Elko.

MITIGATION

For any of the track relocation plans which involve rechannelization of portions of the Humboldt River, or where other heavy construction is proposed, the following measures will be taken to minimize the hazard of creating turbid conditions in the river:

- Where feasible, provide separate settling ponds in which water may be retained long enough to settle out the coarse soil particles.
- Where necessary to minimize erosion, utilize polyethylene sheets to create temporary spillways.
- Construct embankments or excavations as rapidly as possible to minimize the period of time that exposed borrow areas or embankment areas will be exposed to erosion.
- Plant or install permanent erosion control features as soon as practical.

Adequate precautionary measures will be observed during construction to assure that adverse effects on the water quality of the Humboldt River will be minimized.

- Where rechannelization is required, complete the entire excavation and install protective slope paving or riprap throughout, prior to diverting the full flow of the river through the new channel.
- Conduct excavation operations in channels in such a manner that turbidity is minimized.
- Seed scarred areas (where base soil exists as a result of construction activities) with native plants as soon as possible after borrow and waste operations have been completed for each construction season.

In recognition of the local alkali conditions and to combat the dust problem, the following mitigation measures will be adopted for use during any construction operations:

- Adequate sprinkling should be required during grading operations to suppress dust.
- Within construction areas, existing soil from which alkali has been leached should be stockpiled and reused.
- In the event of heavy construction exposing soils containing heavy concentrations of alkali, apply lime treatment to neutralize the alkali.

The excavated areas adjacent to cleaning tracks, used for disposal of solid debris from railroad freight cars, should not be utilized as channels for storm water drainage or for local yard runoff.

Section 14

Air Quality

INTRODUCTION

The local and regional air quality is influenced by the climate and quantity and location of pollutant emitters. The impact of the proposed alignments on the air quality is related to these factors.

CLIMATE

Elko lies in the Humboldt Valley in sagebrush-covered flat land at 5,100 feet elevation. Foothills reaching 6,500 feet MSL rise about two miles to the north and south. The Ruby Mountain Range lies 25 miles to the east and southeast, rising to 12,000 feet in elevation.

According to the U.S. Department of Commerce "Terminal Forecasting Reference Manual"* for Elko's Municipal Airport, the following trends are seen:

- Elko is relatively free from industrial smoke.
- Visibility is sometimes limited to three miles due to dust aloft.
- Low ceilings occur during snow blizzards.
- Heavy fog is rare.
- Afternoon winds up to 25 MPH are common in spring and summer.

EXISTING AIR QUALITY

Elko has a relatively clean air environment. Air inversions which could trap pollutants occur only two or three days a year. Afternoon winds in the spring and summer have a "cleaning" effect as they blow through the valley. Dust aloft can limit visibility, but particulate levels are rarely so high.

Solid particulate matter consists of dust, ash and smoke. Natural particles consist of dust and pollens. However, in industrialized areas, man-made varieties such as smoke from fuel-burning vehicles, pulverized materials such as cement, and lead from automobile exhaust predominate.

Field data is limited for Elko. Data limited to particulate levels show that they rarely exceed standards. In the opinion of EPA and State Environmental Health officials, carbon monoxide levels due to train activity in Elko would be too low to be monitored for the existing alignments. Calculated carbon monoxide levels generated by present railroad activities lie far below the National Ambient Air Quality Standards of 35 ppm for 1-hour averaging times and 9 ppm for 8-hour averaging times. Carbon monoxide exposure levels on each of the alternative alignments will be even lower due to increased train speeds. Therefore, modeling methods were selected as a means to estimate the low levels of carbon monoxide. Since carbon monoxide is a potential health hazard, the major concern of the following air quality discussion will be the model of concentration levels as it relates to train operations. The brief discussions of particulates, organics and hydrocarbons relate examples of the relatively clean air environment in Elko that exists due to geographic location conditions and types of human activity.

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*October, 1955.

Table 14-1 shows particulate levels during 1971, 1972, and 1973 that exceed Nevada's Ambient Air Quality Standards for geometric mean of suspended particulates (60 micrograms per cubic meter) and for 24-hour maximum for suspended particulates (150 micrograms per cubic meter).

The Nevada Standards are more stringent than Federal Standards. The Federal Geometric Mean is 75 micrograms per cubic meter. The 24-hour maximum is 260 micrograms per cubic meter.

Table 14-1

AIR PARTICULATE LEVEL

	Geometric Mean Percentage Excess Over AAQS*	24-Hour Maximum Percentage Excess over AAQS*
1971	10%	5%
1972	0%	0%
1973	6%	52%

*Ambient Air Quality Standard

**This maximum percentage is reached only two or three days during the year.

Besides carbon monoxide, other pollutants such as organic compounds (hydrocarbons and aldehydes) and nitrogen oxides are emitted by the locomotives. Aldehydes are emitted at about one tenth of the rate at which carbon monoxide is emitted from moving locomotives. Hydrocarbons and nitrogen oxides are emitted from an idling locomotive at a rate twice as high as carbon monoxide. From a moving locomotive, they are emitted at a rate of about five times greater than carbon monoxide. Organic compounds and nitrogen can react to form photochemical smog. This smog should not cause a significant problem in Elko, where a large volume of air is available for dilution of the low quantity of gases emitted. The air does not become contaminated from sources outside of Elko, since it is located far from large pollutant sources (i.e., industrial cities, complex freeway interchanges). Even within Elko, there are relatively few polluting industries.

MEASURING POLLUTANT EMISSIONS

The FHWA mixing cell model* modified by the "Simplified Analysis for Estimating Carbon Monoxide Concentrations Near Highway Facilities" from the California Department of Transportation model was used to calculate the dispersion of emissions along the mainline track. Since the model is designed for highway traffic pollutant dispersion, a highway situation, generating an amount of carbon monoxide equivalent to the hourly train emission, was modeled. This model was used to generate a peak hour worst conditions situation to determine the parts per million of carbon monoxide that would be perceived about fifty feet from the track. The worst conditions would be a situation with a very stable atmosphere, wind at a velocity of one meter per second at 12° to $22\frac{1}{2}^{\circ}$ angle between the wind direction and the track (or highway) orientation, located at grade, with the receptor fifty feet downwind.

An EPA dispersion estimate model** was used to calculate the dispersion of emissions around the Western Pacific railroad yard. The EPA model generates a contaminant distribution whereby wind blows the pollutant emitted at a specific height (15 feet was used for locomotives) directly downwind and in the horizontal plane perpendicular to the downwind direction toward ground level receptor points located at distances of 100 meters or greater from the source. Due to the extensive area of the rail classification yard and the sparsity of residences in close proximity to it, this receptor distance was judged to be applicable.

Rates of train emissions were calculated using Environmental Protection Agency emission factors*** and data from computer program modeling in "Exhaust Emissions from Diesel Locomotives."**** The latter analyzes levels of carbon monoxide, unburned hydrocarbons plus nitrogen oxides, and aldehydes which are emitted at each throttle position. For example, at full throttle position, 12.4 gm. HC + NO_x and 1.7 gm. CO are emitted per horsepower hour. In the low throttle position, 13.5 gm. HC + NO_x and 1.0 gm. CO are emitted. These emissions are based on a typical locomotive source of 3600-horsepower, 20-cylinder turbocharged two-cycle engine. (See Exhibits 14-1 and 14-2.)

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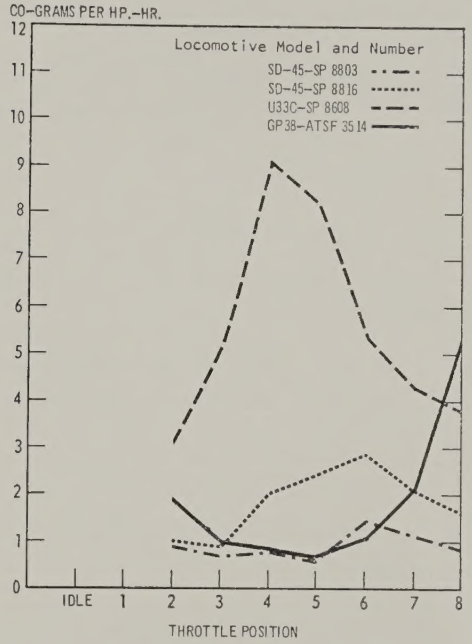
*FHWA, "Mathematical Approach to Estimating Highway Impact on Air Quality," April 1972.

**Turner, Bruce D. Workbook of Atmospheric Dispersion Estimates USEPA, 1971, pp. 6, 41.

*** AP42 3.2.2-2.

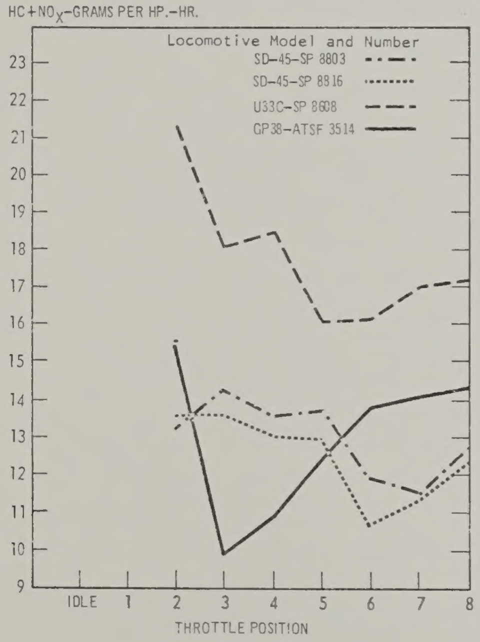
****National Industrial Pollution Control Council, April 1973.

The emission factors depend on several variables. For movements along the mainline track, the factors depend on locomotive speed and throttle settings. For yard activity, the factors depend on horsepower expended per hour and approximate amount of fuel consumed. Exhibits 14-1 and 14-2 show examples of grams of pollutants emitted per horsepower hour based on throttle position.



14-1. VARIATION IN SPECIFIC CONCENTRATION OF CARBON MONOXIDE WITH THROTTLE POSITION

Source: National Industrial Pollution Control Council, "Exhaust Emissions From Diesel Locomotives," April 1973, p. 16.



14-2. VARIATION IN SPECIFIC CONCENTRATION OF TOTAL UNBURNED HYDROCARBONS PLUS NITROGEN OXIDE WITH THROTTLE POSITION

Source: National Industrial Pollution Control Council, "Exhaust Emissions From Diesel Locomotives," April 1973, p. 17.

OPERATING FEATURES AFFECTING AIR QUALITY

Sources

The diesel locomotive engine is the major source of pollution. It emits hydrocarbons, aldehydes, nitrogen oxides, and carbon monoxide. Mechanical refrigerator car engines are secondary sources of pollution. However, refrigerator cars are used extensively for only a fraction of the year, during the height of the fruit and vegetable shipping season. They create pollution within the yard and along the mainline.

Existing and Future Emissions Along Mainline Track

Pollutant emission levels, under worst conditions, were determined by calculating the horsepower demand to move the maximum tonnage (8000 T) at the city speed limits (35 MPH westbound, 15 MPH eastbound) and the grams emitted per horsepower hour. It was determined that less horsepower (producing lower emission levels) was engaged by a slow-moving train. However, the slow movement caused the grams of pollutants emitted per cubic meter to be greater than for faster movement.

For existing mainline traffic, it was assumed that existing restricted speed limits are observed on eastbound and westbound tracks. At the edge of town, a higher throttle is engaged to accelerate the trains. Using the speed limits and the accelerated speeds as the speed parameters, it was determined that the carbon monoxide emitted by one eastbound train through town (three miles) would equal the carbon monoxide emissions of 15 automobiles traveling at 25 MPH over the same distance.* One SP westbound train would emit the same amount of CO as 10 automobiles traveling at 25 MPH. The westbound train emits less at the higher throttle setting and faster speed. (See Appendix 4-A, "Air Quality Calculations.")

A peak hour may include the passage of two trains along the mainline tracks. The emissions from these two trains would be equivalent to approximately 25 automobiles traveling at 25 MPH through Elko. The concentration perceived fifty feet from the track would be 0.08 ppm under the worst conditions. (Calculations are based on the FHWA mixing cell model.)

An average railroad movement over an 8-hour period would be one train per hour. For an eastbound train, this would be equal to 15 automobiles traveling at 25 MPH through Elko. Assuming worst conditions with no change in wind direction over the 8-hour period would mean multiplying the peak hour level by a factor of 8/8 (eight hours with no change/total 8-hour period), which results in an 8-hour average concentration of 0.08 ppm CO, identical to the peak hour. This is based on Method (4) from Appendix H - "Use of Dispersion Models to Estimate Air Quality in the Vicinity of an Indirect Source," USEPA document, Interim Guidelines for the Review of the Impact of Indirect Sources on Ambient Air Quality, July 1974, pp. H-67,68.

Table 14-2 shows the carbon monoxide levels during 1-hour and 8-hour averaging times. These concentrations lie far below the NAAQS 1-hour standard of 35 ppm and the 8-hour standard of 9 ppm.

Existing and Future Emissions in the Yard

The two categories of diesel engine operations which have significance for emissions in the yard are idling and engaging horsepower (locomotives and mechanical refrigerator cars). The former depends on the minimal amount of fuel consumed. The "consists" or groups of diesel locomotive units for line-haul operations idling during the ten daily inspection stops and the idling switch engine fall into this category. The operating switch engine is the major source during much of each 24-hour period from the second category.

Table 14-2
SUMMARY OF AIR POLLUTION CALCULATIONS PER 1-HOUR AND 8-HOUR PERIODS
ALONG THREE MILES OF ELKO MAINLINE TRACK

	ppm	Kg*	Average Number of Through Trains Per Hour	Equivalent Automobile Traffic Volume (Autos/hour)
Carbon Monoxide -- Existing Conditions				
Peak 1-Hour Concentration Level	0.08	3.4	2	25
8-Hour Averaging Time Concentration Level (Based on constant wind direction during 8 hours)	0.08	2.0	1	15
Carbon Monoxide -- Future Conditions				
Peak 1-Hour Concentration Level	0.07	2.6	2	20
8-Hour Averaging Time Concentration Level (Based on constant wind direction during 8 hours)	0.07	1.6	1	12

* Total weight of CO produced along three miles of trackage by number of trains indicated.

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*USEPA AP 42, 1973.

The rate of emission from engines idling can vary greatly from engines traveling on the mainline track. For example, an idling engine may emit 0.14 grams carbon monoxide per second and an accelerating engine may emit 5.1 grams CO per second. The diesel engine on mechanical refrigerator cars may emit 0.08 grams CO per second. The emissions from idling locomotive engines and refrigerator cars standing idle in the yard build up higher concentrations than those emitted by trains moving through Elko. Under worst conditions, a concentration of 4 ppm CO may be perceived 100 meters downwind from an idling 5000-horsepower engine.

Refrigerator car trains operate only during the height of the fruit and vegetable season. They may stand idling in the yard for a short period of time. At 100 meters downwind, a concentration of 0.2 ppm of CO can be perceived from one refrigerator car. However, from a distance of 100 meters directly downwind from the center of a line of refrigerator cars, a concentration of 1.2 ppm of CO would be present. This level is generated under worst conditions with a wind velocity of one meter per second at a direction perpendicular to the line. These levels are based on EPA dispersion estimate models.

The existing peak-hour WPRR classification yard activity could include one idling switch engine, one standing train with an assumed 50 refrigerator cars, and one standing train being inspected. An hourly average during an 8-hour period could include one train being inspected and one switch engine idling.

The future peak-hour yard activity is assumed to include one idling switch engine, one train with 50 refrigerator cars, one train undergoing inspection, and three idling consists or groups of road locomotives. The switch engine moving back and forth along the trackage would contribute low concentrations, similar to through-train activity levels of 0.08 ppm. The average hourly activity over an 8-hour period is assumed to include one train undergoing inspection, three standing consists, and one switch engine idling in the yard.

The worst conditions assume stagnant atmospheric conditions and were used to calculate concentration levels with each model. These assumptions and conditions generate higher levels than would normally be perceived in Elko. In fact, wind velocities in Elko exceed one meter per second more than seventy percent of the time. Frequent shifts of wind direction serve to diffuse the emission more horizontally, which also lowers concentrations of pollutants under actual conditions.

It is unlikely that a receptor or observer would perceive significant concentrations of CO from more than one or two sources in the classification yard. The widespread location of activities in the yard prevents a build-up of levels in any one area. Although the yard is less than a mile long at the present time, it will be more than a mile long in the future.

The daily and seasonal variations in shipping and switching movements and railroad operating schedules make prediction of yard activities very difficult.

However, under worst conditions each pollutant source contributes less than the 1-hour averaging time standard of 35 ppm. Under constant wind direction conditions during an 8-hour averaging time, the standard of 9 ppm is unlikely to be exceeded. (Refer to methodology given for "Existing Emissions Along Mainline Track.") Table 14-3 summarizes the yard's carbon monoxide emissions.

AIR IMPACT LEVELS

Assumptions and Interpretations of Values

Evaluation of the calculated amount of pollution along the railroad mainline is based on comparisons with the volume of automobiles that would produce an equivalent amount of pollution as they travel a similar three-mile crosstown distance at city speed limits.

The line source model used to predict concentration levels along the main line evaluates the grams emitted per meter per second as the line of traffic moves along. The very light wind blowing at a small angle with the road generates the highest exposure level for observers very close to the traveled way.

To predict yard concentration levels, the point source model evaluates grams emitted per second by the stationary diesel engine in a locomotive or refrigerator car. It incorporates the height at which the pollutant is emitted with the horizontal parameters by which the wind disperses it. Observers directly downwind would receive the greatest exposure.

PROJECTED AIR QUALITY IMPACT

Assumptions

The maximum operating speeds will increase along the mainline track for both Western Pacific and Southern Pacific trains. Since Western Pacific trains must stop at the yard, westbound trains must slow down as they approach the yard, and eastbound trains accelerate rather slowly as they depart from the yard. Thus Western Pacific speeds will be lower than Southern Pacific train speeds.

Based on continuation of present train activity and tonnage, the pollution levels along the mainline track should decrease slightly at the higher speed and throttle setting. Once a turbocharged engine is placed into throttle position No. 6 (the highest is No. 8), the combustion efficiency is improved, which results in lower specific concentrations of carbon monoxide.

Within the new yard, two switch engines will handle the expanded classification operations. Road locomotive "consists" will idle, waiting to handle the newly classified eastbound trains. Such standing consists will increase the carbon monoxide levels in the yard.

Conclusions

The 1-hour averaging time standard and the 8-hour averaging time standard should not be exceeded in the yard due to the widespread location and daily variations in the activities and shipments as well as frequent unstable atmospheric conditions in Elko. Only under an unlikely circumstance of a very stable atmosphere with very calm wind from a constant direction during which time more than three idling locomotives stand immobile very close together, for more than eight hours, could the 8-hour averaging time standard be slightly exceeded in a small area directly downwind.

Table 14-3
SUMMARY OF WESTERN PACIFIC CLASSIFICATION YARD CARBON MONOXIDE AIR POLLUTION PER 1-HOUR AND 8-HOUR PERIODS

Function	Peak 1-Hour	8-Hour Averaging Time (Based on constant wind direction)
EXISTING		
Locomotive Stopped for ICC Inspection	4.0 ppm	4.0 ppm
Idling Switch Engine	4.0 ppm	4.0 ppm
Line of 50 Mechanical Refrigerator Cars	1.2 ppm	--
Moving Switch Engine	0.08 ppm	0.08 ppm
FUTURE		
Locomotive Stopped for ICC Inspection	4.0 ppm	4.0 ppm
Road Locomotive Standing Idle	4.0 ppm (each) 0.6 ppm (at 170 meters)	4.0 ppm (each) 0.6 ppm (at 170 meters)
Idling Switch Engine	4.0 ppm	4.0 ppm
Line of 50 Mechanical Refrigerator Cars	1.2 ppm	--
Moving Switch Engine	0.08 ppm	0.08 ppm

Note: Measurements are based on observer distances of 100 meters from the source except where noted otherwise. Due to the extensive size of the yard (less than a mile long at present; more than a mile long proposed), to the hourly and daily fluctuations in rail operations and to the wide distribution of each locomotive (point source of emission), concentrations are not directly additive. At a point 100 meters south of the WP mainline and east detour (see Exhibit 3-3), the levels from the idling switch engine and idling locomotive being inspected may be perceived (8 ppm) under rather stagnant "worst" atmospheric conditions. At a point 170 meters south of the diesel house (see Exhibit 3-3), the levels from the road locomotive consist (0.6 ppm) and refrigerator car train (1.2 ppm) totaling 1.8 ppm of CO may be perceived during the short fruit shipping season. However, significant levels from all source points in the yard are unlikely to be perceived at any single receptor point.

Section 15

Noise

INTRODUCTION

The existing noise impact of the railroads is one of the most serious adverse environmental impacts of the present situation. The railroads have an adverse noise impact on the entire city, mainly through the constant sounding of railroad horns. The impact is of course most severe in the Central Business District and some residential areas which adjoin the present tracks. In any community the existing railroad noise level experienced in Elko would be a matter of public concern, but in a community whose economy depends in part on tourism, the problem is understandably of special concern.

This analysis deals with the noise levels in Elko and the existing and projected contributions of noise made by the railroads. Field noise measurements were taken on May 9, 10, 22 and 23, 1974, at a dozen selected sites in Elko to assess the present noise impact of a single train. The Wyle Laboratory predictive sound measurement model, "Assessment of Noise Environments Around Railroad Operations," was utilized to determine the present and possible future impacts over a 24-hour period.

First, railroad noise is examined within the context of general noise levels in the community. Next, the noise contributions from each railroad source, including the separate operation features of the trains, are considered. The extent of impact on various types of land uses is evaluated. Finally, possible noise mitigation measures are examined.

Certain of the track relocation plans would also involve the construction of highway overpasses, which would carry vehicular traffic substantially above the elevation of the surrounding terrain. The expected noise impacts in these localized areas of elevated vehicular roadways are also examined.

EXISTING NOISE SOURCES IN ELKO

In addition to the railroads, other major noise sources include:

- Traffic on U.S. Route 40 or Idaho Street, a major cross-country highway heavily traveled by trucks;
- Local street traffic;
- Some local industries, such as the concrete plant; and
- Air traffic mainly utilizing small private planes from the Elko airport.

Each of these other sources contributes to the noise levels in Elko but rail traffic remains the major noise source and the one which is most irritating to people. Train horns particularly produce a high noise level, higher than trailer rig trucks, concrete and gravel extraction and processing operations, or low-flying propeller planes.

MEASURING NOISE IMPACTS

Several ways of measuring noise have been used by various authorities. The two types of measures used in this analysis are expressed in terms of dBA and L_{dn}. The dBA scale is often used for noise measurement because it closely follows the response characteristics of the human ear. The length of time a particular dBA value is exceeded is measured in terms of percentile levels ("$L_{percentile}$"). Thus L_{10} = 60dBA means that the 60-decibel level is exceeded for ten percent of the time.

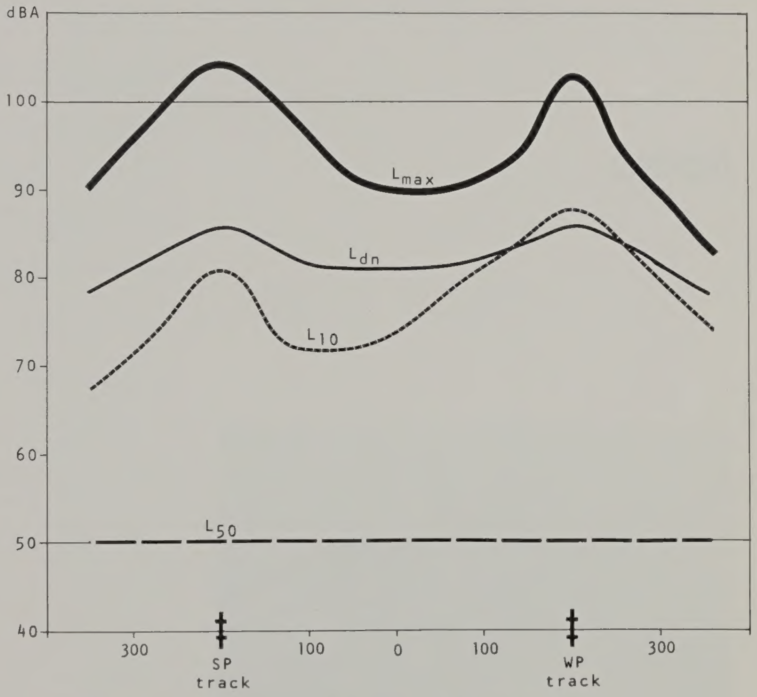
The dBA values measured during railroad operations are useful to compare with individual noise events of other sources.

Source	dBA
Train horn*	105-116
Locomotive*	90
Rail car*	83
Trailer rig truck*	75
Propeller aircraft	79

These give an indication of the severity of the noise from the railroad. However, noise from individual events cannot be expressed readily in percentile noise levels. Neither can individual events be combined. Therefore, a more appropriate measure of impact is L_{dn}. Day-Night Average Sound Level. It takes maximum noise levels during a 24-hour period and averages them with background daytime and nighttime levels. The averaging includes a weighting for the greater obtrusiveness of noises during nighttime hours. The results can be plotted in the form of noise contours.** The noise contour maps are based therefore on L_{dn} levels. A comparison of L_{dn} and dBA scales appears in the diagrams of noise levels at the street crossings.

EXISTING NOISE LEVELS AT VARIOUS STREET CROSSINGS

Exhibits 15-1, 15-2, and 15-3 show the relationships between maximum noise levels that were hand-recorded on site (L_{max}), noise levels exceeded ten and fifty percent of the time (L_{10} and L_{50}), which were statistically recorded by a noise classifying machine, and average daily noise levels (L_{dn}) which were calculated from the Wyle lab model. (See Appendix 4-B, "Noise



15-1. EQUIVALENT TRAIN NOISE LEVELS BASED ON DIFFERENT TIME MEASUREMENT SCALES
Location: East of 14th Street (Cross Section)

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*Measurement location is about 100 feet at 30 MPH.

**The "day" extends from 7:00 AM to 10:00 PM and the "night," with a 10 dB weighting penalty, extends from 10:00 PM to 7:00 AM. It is based on time integrated A-weighted measures of discrete single events (SENELS) and weights their effective impact on human activity by their time of occurrence. The finalized output is in the form of A-weighted, duration-corrected noise contours which account for number of operations and time of occurrence during the 24-hour day.

Data and Methodology.") One notes that the curves reach a maximum over the center of the track. The L_{max} (maximum noise level) reads about 105 dBA from the horn blast. Based over a half hour period, in combination with the ambient noise level, the ten percent (L_{10}) exceedence level lies between 81 dBA and 88 dBA.* Over a 24-hour period which combines many train passes and day/night ambient levels, the L_{dn} maximum level is about 86.

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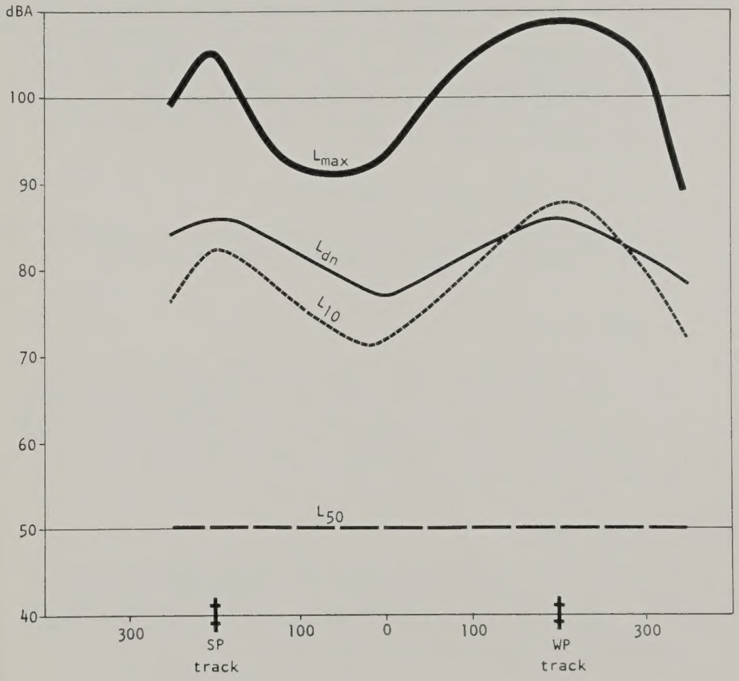
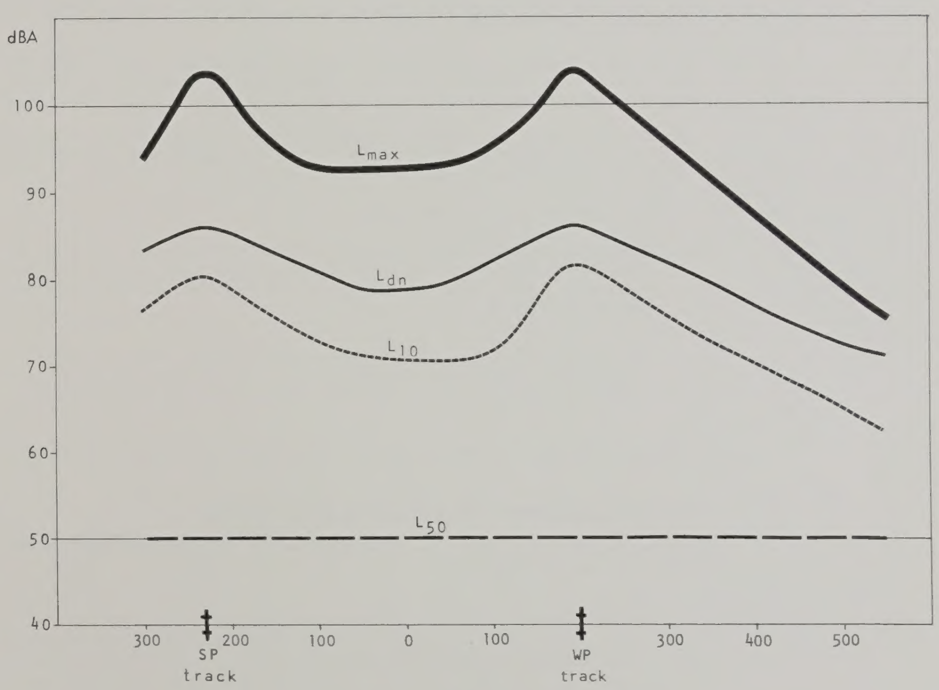
*The level exceeded 50 percent of the time lies between 50 dBA - 55 dBA.



15-2. EQUIVALENT TRAIN NOISE LEVELS BASED ON DIFFERENT TIME MEASUREMENT SCALES
Location: 6th Street (Cross Section)



15-3. EQUIVALENT TRAIN NOISE LEVELS BASED ON DIFFERENT TIME MEASUREMENT SCALES
Location: 2nd Street (Cross Section)

The curves peak more over the eastbound track due to the attenuation effect of the nearby houses acting as barriers. Since the westbound track is bordered by paved streets (Commercial and Railroad) instead of buildings, the sound diffuses more, and it is shielded less.

The curves peak more over the tracks at Sixth Street where the structures lie very close to the track and block out noise levels perceived, for instance, a block from the track. The L_{50} level is higher due to concentrated activities in the center of Elko. At Fourteenth Street, the sound levels can dissipate more since the absence of buildings allows noise levels to spread over a wider area.

At Second Street, the tracks are slightly further apart. Some structures are located near each track so the spread of the noise levels is fairly equally distributed over both tracks.

Exhibit 15-4 shows L_{dn} contours of the existing alignment which were calculated using the procedure set forth in the Wyle Lab Report "Assessment of Noise Environments Around Railroad Operations"

The following assumptions were made:

- Westbound trains travel at 40 MPH and eastbound trains travel at 20 MPH. This takes into consideration the acceleration of the 6600-foot (average length) westbound train and the 4700-foot (average length) eastbound train.

- The engine accelerates once outside of Elko before the caboose has cleared the final grade crossing. Thus, the caboose travels at speeds exceeding the set limits of 15 MPH eastbound and 35 MPH westbound.

OPERATING FEATURES OF TRAINS AND RAILROAD ACTIVITIES AFFECTING NOISE LEVELS

Sources of Railroad Noise on Existing Mainline Tracks

The major sources of railroad noise outside the railroad yard are, in decreasing order of magnitude:

- the horns;
- noise emanating from groups of diesel locomotive units for line operations (known as "consists"); and
- noise created by the freight cars.

A number of factors can influence the level of noise from these sources. These include changes in speed, condition of tracks, condition of train (servicing), and structures or barriers near the tracks.

The horn, the source of the severest noise impact, is blown at every grade crossing in town. At higher speeds a train will travel more feet while the horn is sounding and thus may expose more feet of track and surroundings to its noise. The extent of this impact (i.e., the distance from the tracks) depends on a wide range of factors, including the presence of structures or barriers, weather conditions, etc.

Speed also affects the magnitude of the locomotive and freight car noise. A locomotive increases its engine and exhaust noise levels as it accelerates. At the same time, the freight cars become noisier as they move at higher speeds. The condition of the track influences the noise from both the locomotives and cars. Continuously welded track does not cause the "clickety clack" that jointed track does. Thus the noise level can be reduced by 4-8 dBA. The condition and load of the cars also influences the level of noise. "Flat" wheels add up to 15 dBA and unloaded freight cars tend to be noisier since they bounce and bang over the tracks more than loaded. Finally, structures or barriers near the tracks will attenuate noises from the freight cars and locomotives.

OPERATION CHARACTERISTICS OF THE MAIN LINES

Current speed limits and horn-blowing safety requiremeents imposed on trains passing through Elko affect the train noise generated in Elko.

Eastbound Trains

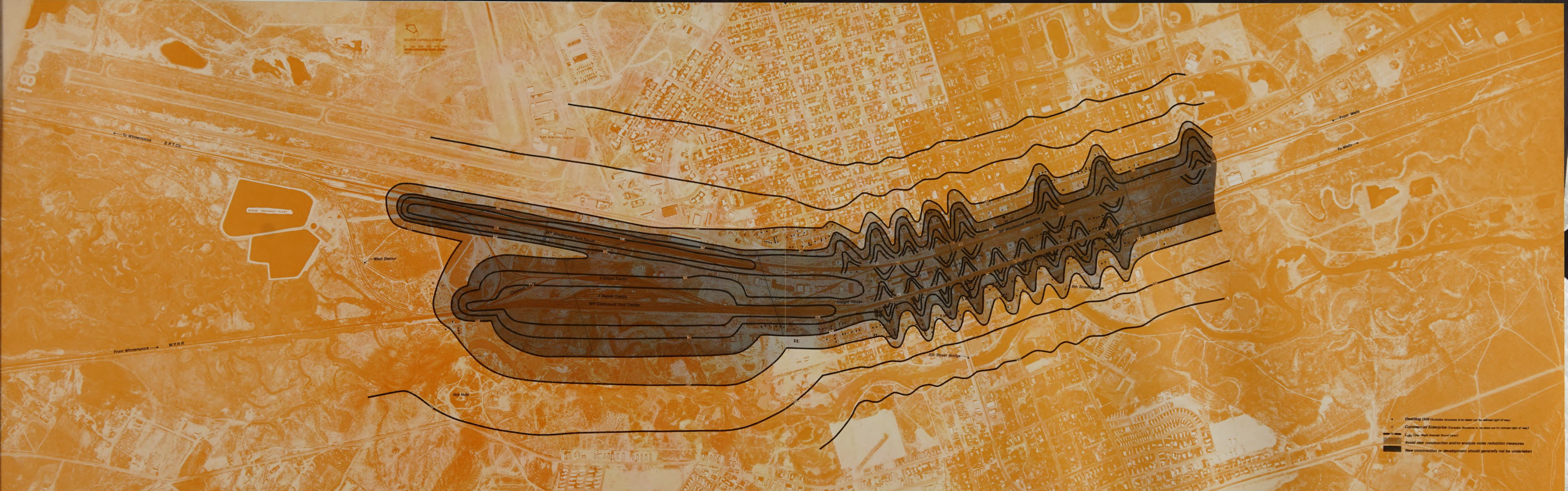
All trains are restricted to relatively low speeds within WP yard limits. Leaving the yard eastbound, and ascending the 0.13 percent grade, they accelerate at full throttle position until they attain a speed of 15 MPH on Silver Street, which speed limit prevails to Twelfth Street. East of Twelfth Street the speed restrictions no longer apply. Thus at Twelfth Street the locomotive is again placed at the full throttle position to accelerate to road speed.

Westbound Trains

For these movements, which have the benefit of the descending grade, the locomotives operate at a reduced throttle position, and may or may not stop at Western Pacific's westbound yard. In any event, the locomotive units, being at the west end of the train, will be standing at the point approximately 1-1/2 miles west of Third Street.

Grade Crossing

For both directions, the horns must be blown at all grade crossings for safety purposes. Thus, eastbound trains blow their horns at nine grade


I 80
DE LEUW, CATHER & COMPANY
0 100 200 300 400 500
FEET
ELKO MUNICIPAL AIRPORT
← To Winnemucca
S.P.T.Co.
SEWAGE TREATMENT PLANT
West Detour
From Winnemucca →
W.P.R.R.
Hot Hole
WP Westbound Yard Tracks
4 Diesel Tracks
Cleanout Track
5 Repair Tracks
WP Eastbound Yard Tracks
Freight House
SP Westbound Mainline
9th Street Bridge
5th Street Bridge
← From Wells
To Wells →
55
60
65
70
75
80
85
Dwelling Unit (Excludes structures to be taken out for railroad right-of-way)
Commercial Enterprise (Excludes Structures to be taken out for railroad right-of-way)
70
L_{dn} (Day-Night Average Sound Level)
Avoid new construction and/or analyze noise reduction measures
New construction or development should generally not be undertaken

15·4 Noise Contour Levels along Existing Alignment

crossings. Westbound trains have seven grade crossings where they must blow their horns. The greater number of grade crossings on the eastbound track can create noisier train passbys than the westbound track.

EXISTING YARD OPERATIONS

The present yard is located at the western end of Elko. Presently, it handles a limited amount of car classification as well as all the service inspection of Western Pacific trains. These activities are the source of noises from switch engines, idling locomotives, and idling refrigerator car engines.

The hours of the yard operations fluctuate widely from day to day. A representative day might include ten trains to be inspected, two trains with refrigeration cars to be classified, and two other trains to be classified without refrigeration cars. For analysis purposes, the hours of operation are separated into the day and night periods. During the day period, 5 trains are inspected for about one hour each, refrigerator cars wait up to 5 hours for classification, switching operations proceed for up to 12 hours each day, and a switch engine idles for 3 hours. During the night period, the 5 inspections may take a total of five hours, refrigeration cars may wait 5 hours for classification, switching operations are underway for 6 hours, and a switch engine sits idling for 3 hours.

For purposes of noise analysis, the following time divisions have been made concerning yard operations.

	Hours of Operation		
Existing Yard	7 AM - 10 PM	10 PM - 7 AM	Trains/Day
Inspection Track	5	5	10
Switching 2 Engines	10	5	--
Switching 1 Engine	4	2	--
Ready Tracks	-	-	--
Refrigerator Cars	5	5	2
Idling Switch Engines	3	3	--

Description and Interpretation of Impacts

Each train passage affects a wide area. Thus, both west and eastbound trains will impact the commercial centers and residences adjacent to the yard, Railroad Street, Commercial Street, and Silver Street, plus streets not abutting the tracks.

Two classifications are applicable to dwelling units: The first one involves avoidance of new construction in undeveloped land. Since the majority of land is developed, new construction should be acceptable. However, construction plans should include noise reduction. The second classification recommends that new construction should not be undertaken. Since at present, plans for construction do not appear extensive, this classification may not have a very significant impact.

One may group existing categories of dwelling units in three ways: mobile homes, homes in "not okay" condition, and homes in good condition. The impact will be significant on the homes in good condition since these cannot be relocated as easily as mobile homes and their value may be higher than homes in unsatisfactory condition.

By evaluating the existing types of residences in the impacted areas, one may see which areas can be filled in with newer, more modern buildings and which areas should not be developed. Since about one third of the existing dwelling units are in need of some maintenance work which ranges from a paint job to reconstruction, one may see the extent of reconstruction necessary.

Exhibit 15-5 is a more comprehensive summary of accepted noise standards for a variety of activities. In this diagram the bar indicates the noise range in which a given response from urban populations can be expected. For example, with single family residential dwelling units, within a range from 55-65 L_{dn} no special noise insulation will be required for new construction. Within this range some noise complaints may occur, and noise may occasionally interfere with some activities.

Between the range of 63-70 L_{dn} new housing construction should generally be avoided except as possible infill of already developed areas. In such cases a detailed analysis of noise reduction requirements should be made, and needed noise insulation features should be included in the building design.* With these noise levels in developed areas individuals may complain, perhaps vigorously, and group action is possible.

Finally between the range of 73-90 L_{dn} new construction or development should not be undertaken. In developed areas, repeated vigorous complaints and concerted group action might be expected.

Tables 15-1 and 15-2 give a tabulation of the impacted structures.

Table 15-1
TABULATION OF EXISTING LAND USES IN NOISE CONTOUR AREAS

	65 - 75 L_{dn}	70 - 75 L_{dn}	Greater than 75 L_{dn}
Dwelling Units	120	92	64
Commercial/Retail Enterprises	25	32	69
Commercial/Industrial Enterprises	2	--	6
Motel/Hotel	6	5	7

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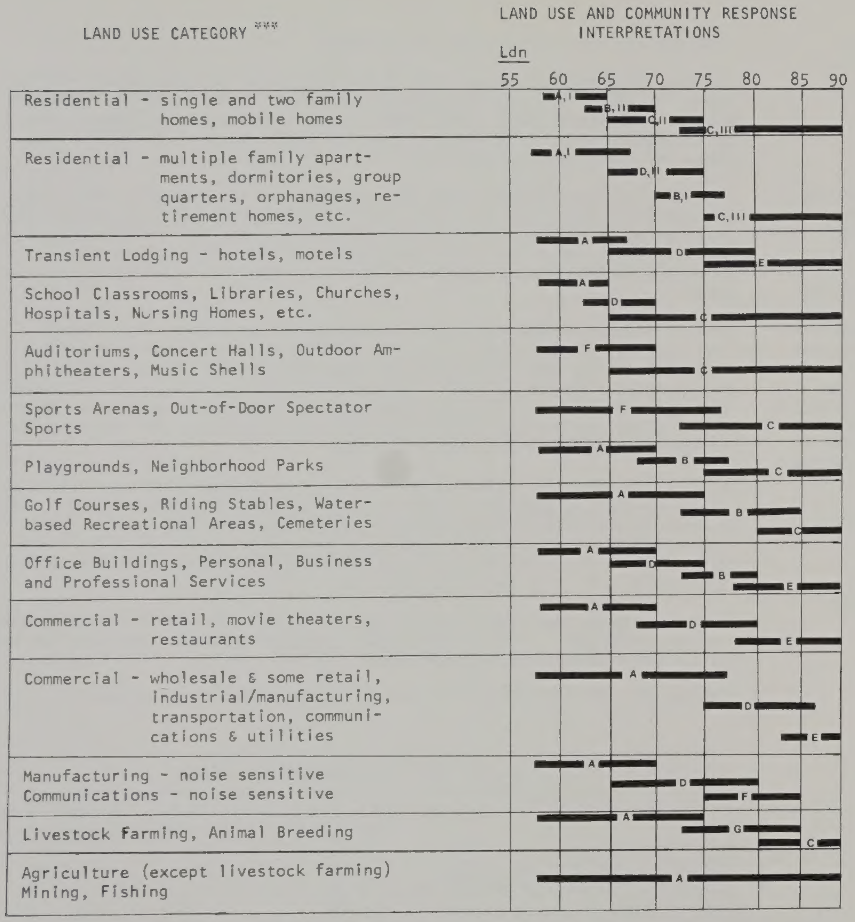
*No provision under existing federal or state legislation for noise insulation as part of public project.



15-5 NOISE COMPATIBILITY INTERPRETATION

Community Response Predictions*

I Some noise complaints may occur, and noise may, occasionally, interfere with some activities.

II In developed areas, individuals may complain, perhaps vigorously, and group action is possible.

III In developed areas, repeated vigorous complaints and concerted group action might be expected.

General Land Use Recommendations**

A. Satisfactory, with no special noise insulation requirements for new construction.

B. New construction or development should generally be avoided except as possible infill of already developed areas. In such cases, a detailed analysis of noise reduction requirements should be made, and needed noise insulation features should be included in the building design.

C. New construction or development should not be undertaken.

D. New construction or development should not be undertaken unless a detailed analysis of noise reduction requirements is made and needed noise insulation features included in the design.

E. New construction or development should not be undertaken unless directly related to railroad-related activities or services. Conventional construction will generally be inadequate and special noise insulation features must be included. A detailed analysis of noise reduction requirements should be made and needed noise insulation features included in the construction or development.

F. A detailed analysis of the noise environment, considering noise from all urban and transportation sources should be made and needed noise insulation features and/or special requirements for the sound reinforcement systems should be included in the basic design.

G. New development should generally be avoided except as possible expansion of already developed areas.

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*Community response predictions are generalizations based upon experience resulting from the evolutionary development of various national and international noise exposure units in particular, Day Night Average Sound Level (L_{dn}). For specific locations, considerations must also be given to the background noise levels and the social, economic, and political conditions that exist.

**Land use recommendations are based upon experience and judgmental factors without regard to specific variations in construction (such as air conditioning and building insulation) or in other physical conditions (such as the terrain and the atmosphere). These features and others involving social, economic, and political conditions must be considered in recommending individual use and density construction combinations in specific locations.

***Noise in San Francisco Department of City Planning, City and County of San Francisco, July, 1974. Page 34.

Table 15-2

GENERAL LAND USE RECOMMENDATIONS FROM EXHIBIT 15-5 APPLIED TO TABLE 15-1

Recommendation	Existing Adversely Impacted Community
Avoid new construction and/or analyze noise reduction measures	120 Dwelling units 5 Motels/hotels
New construction or development should generally not be undertaken	156 Dwelling units 7 Motels/hotels 69 Commercial/retail enterprises

PROJECTED RAILROAD NOISE IMPACT LEVELS

Assumptions

Mainline Track

- Future noise level projections are based on existing level of traffic on the new alignments. It is possible, however, that the current 60 million ton volume per year will increase on an annual 80 million tons by the turn of the century.
- Average speed of Southern Pacific through-train operations would increase to 50 MPH.
- The Western Pacific trains would average 20 MPH since they slow down to stop at the yard and slowly accelerate as they leave the yard.

Yard Activity

- Six eastbound trains are classified at Elko, involving 400 to 500 cars per day.
- Two switch engines work 24 hours per day.
- Three motive power consists, each composed of four to five diesel units, idle in the locomotive servicing area.

Taking into consideration the daily fluctuation during the two divisions of the 24-hour period, a representative day may include two switch engines operating for 11 hours. During the remaining hours, one switch engine may sit idling while the other continues to operate. Five Western Pacific trains will pause for about an hour in the yard for inspection. Three consists will be idling, ready to handle classified eastbound trains during the entire 15-hour daytime period. The refrigerator cars may wait up to 5 hours for classification.

For the future alignments, contours derived from calculations using the Wyle model were superimposed on the alternative alignment maps. The conditions considered were the level terrain, welded track, 50 MPH for Southern Pacific trains and an average 20 MPH for Western Pacific trains, existing average train lengths, and average frequency of operations. The elimination of horn-blowing at grade crossings lowers the noise contours by 5 Ldn to 10 Ldn from the existing ones. The future speed increase amplifies the locomotive and freight car noise, but this increase is smaller in magnitude than the magnitude of noise reduction stemming from eliminating the horn-blowing. (See Exhibits 15-6, Projected Noise Contour Levels along Northbank Alignment; 15-7, Projected Noise Contour Levels along Southbank Alignment; and 15-8, Projected Noise Contour Levels along Silver Street Alignment.)

The projected noise contour maps show corridors of severe adverse noise impact and less severe adverse impact. The dwelling units and commercial enterprises which are adversely impacted are also designated. (See Table 15-3.)

Table 15-3

GENERAL LAND USE RECOMMENDATION ON PROJECTED ADVERSELY IMPACTED COMMUNITY

	Alignments		
Recommendation	Northbank	Southbank	Silver Street
Avoid New Construction and/or analyze noise reduction measures	82 DU 1 CH	129 DU 1 CH	82 DU 1 CH
New construction or development should generally not be undertaken.	65 DU 1 RE	52 DU 2 RE	93 DU 5 RE

Key:
RE Commercial/Retail Business/Office/Motel/Hotel
DU Dwelling Unit
CH Church

Note: Excludes structures to be removed for railroad right-of-way.

The projected noise contours do not reflect a 10 dB reduction of exhaust noise levels with mufflers which may be possible from the enactment of an EPA proposal for railroad noise emission standards. These would require muffler installation on most diesel-electric engines. The deadline for installation would be four years after the approval and enactment of the final regulation.

SILVER STREET

The Silver Street alignment would increase the noise levels along Silver Street due to the increased speed and expanded rail traffic volume.

This alignment will adversely impact fewer commercial activities than the existing alignment. The number of residences affected will also be less.

A continuous line-of-sight height berm could lower the noise level by 5 dB. However, with the grade crossings at 3rd, 4th, 6th and 11th Streets, the berm cannot be continuous. Noise reduction is minimal with a non-continuous berm.

NORTH BANK

The North Bank alignment would not adversely affect as many dwelling units as the other alignments. It would be located on the fairly densely populated central business district side of the river.

SOUTH BANK

The South Bank alternative would adversely affect the greatest number of dwelling units. However, less of these are in the most severe adverse category than in the other alignments.

PROJECTED VEHICULAR NOISE IMPACT LEVELS

The diagrams on Exhibit 15-9 represent the expected noise impacts resulting from vehicular traffic on elevated bridges for each of the three track relocation alternatives. The contours are expressed in L_{10} sound levels, which represent the level of noise which will only be exceeded 10 percent of the time.

For each alternative, a brief description is included of the land uses affected by the resulting noise levels. The impacts are described in terms of the following Federal Highway Administration Noise Standards, as set forth in Policy and Procedure Memorandum No. 90-2, issued February 8, 1973.

Land Use Category	Exterior Design Noise Level*	Examples
A	60 dBA	Amphitheatres, parks or open spaces requiring serenity and quiet.
B	70 dBA	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, picnic areas, recreation areas, playgrounds, active sports areas, and parks.
C	75 dBA	Developed lands, properties or activities not included in A or B.
D	Unlimited	Undeveloped lands.
E	55 dBA (Interior)	Inside public meeting rooms, schools, churches, libraries, hospitals and similar public buildings.

Vehicular Noise Impacts, North Bank Railroad Alignment

At the proposed Fifth Street Bridge and Overpass, two dwelling units adjacent to Douglas Street would be affected by L_{10} noise levels exceeding 70 dBA.

At the proposed Eighth Street-Lamoille Road Bridge and Overhead, no dwelling units would be affected by L_{10} noise levels exceeding 70 dBA.

Vehicular Noise Impacts, South Bank Railroad Alignment

At the proposed Fifth Street Bridge and Overhead, two dwelling units would be affected by L_{10} noise levels exceeding 70 dBA at the corner of Wilson Avenue and Fifth Street.

At the Eighth Street-Lamoille Road Bridge and Overpass, two dwelling units would be affected by L_{10} noise levels exceeding 70 dBA at the corner of Front Street and Lamoille Road.

Vehicular Noise Impacts, Silver Street Alignment

At the Fifth Street Overpass, five dwelling units would be affected by L_{10} sound levels above 70 dBA, the FHWA Residential Noise Standard. These structures lie on Douglas and River Streets, adjacent to the

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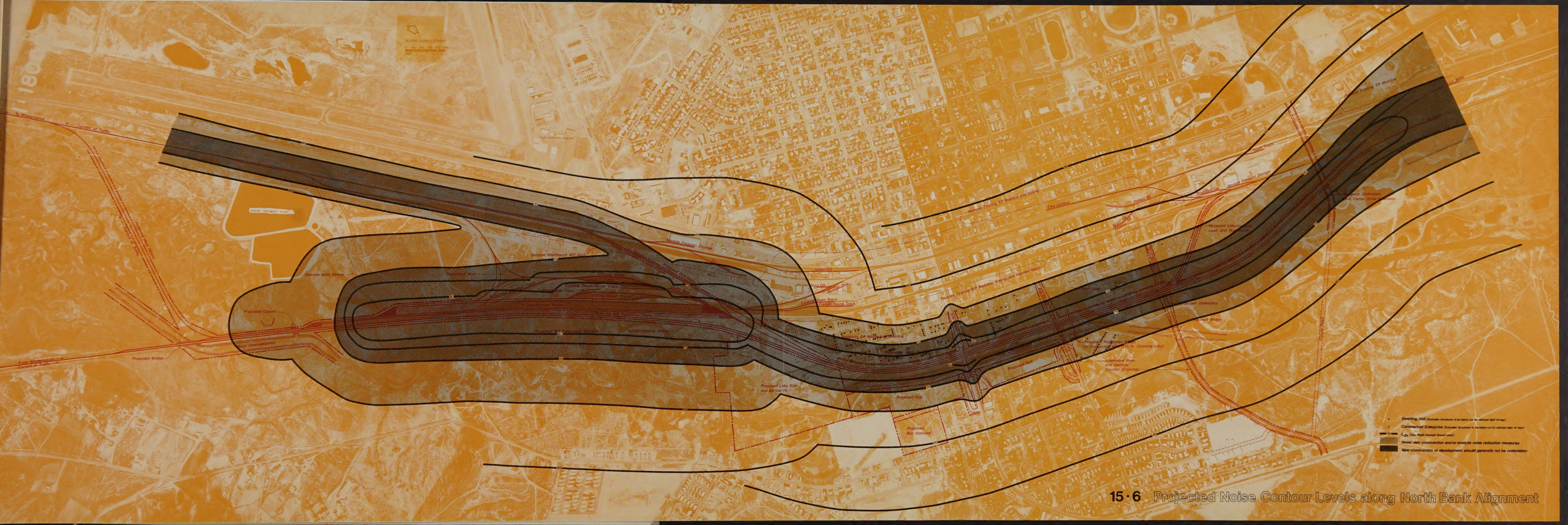
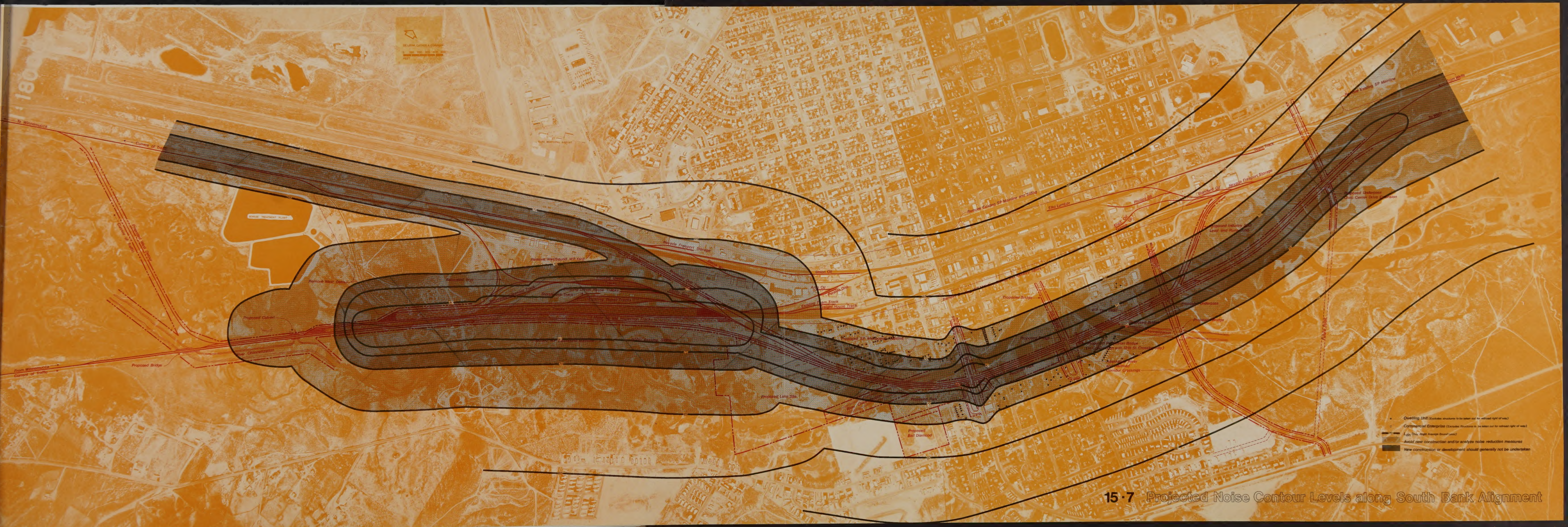
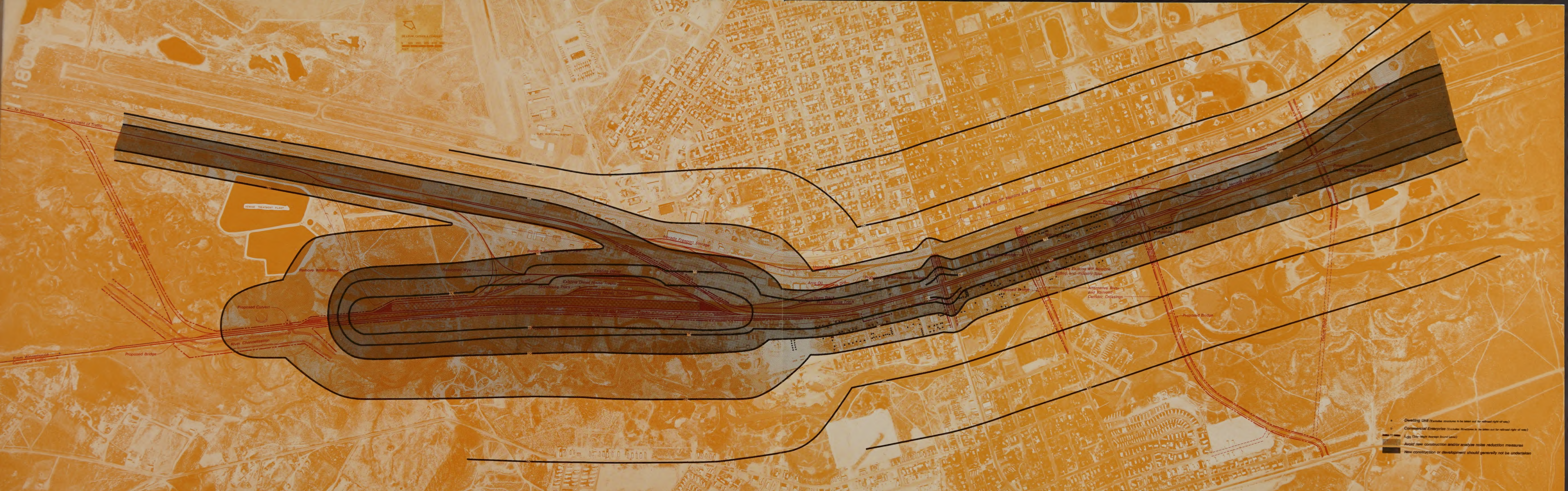
*Noise level can be exceeded 10 percent of the time (L_{10}).


DE LEUW, CATHER & COMPANY
0 100 200 300 400 500
FEET
To Winnemucca
Current of Traffic
Proposed West Detour
Current of Traffic
From Winnemucca
Current of Traffic
Proposed Bridge
River Channelization
Proposed Culvert
SEWAGE TREATMENT PLANT
Remove West Detour
Relocated Wye
Remove Westbound WP Yard
Existing Diesel Tracks
Existing Diesel House Tracks
Storehouse Track
Existing Repair Tracks
8 Classification Tracks
2 Make-Up and Inspection Tracks
Proposed WP Eastbound Mainline
9000' Passing Siding
Nevada Freeport Storage
Proposed Drill Track
Outfit Spur
Union Oil
Arco Oil
Peraldo Dist.
Existing Team Track
Freight House Track
Proposed Lake Site and Barrow Pit
Proposed SP Westbound Mainline
Proposed Park
Proposed Ball Diamond
Remove Existing SP Mainline and Siding
Remove Existing WP Mainline, Siding, and Industry Spurs
Elko Lumber
Phillips 66
Shell Oil
Texaco Oil
Standard Oil
Nevada Freeport Storage
Team Track
Remove Existing SP Mainline
Proposed Underpass
Civic Center Drive Extension
Proposed Industry Spur Lead and Runaround
Yard Lead
Proposed Underpass
Proposed Bridge
Proposed Pedestrian Bridge (In Conjunction with 12th St. Crossing only)
Alternative River and Railroad Corridor Crossings
River Channelization
Proposed Park
5th St.
9th St.
12th St.
Proposed Bridge
Errecart Road
55
60
65
70
75
80
● Dwelling Unit (Excludes structures to be taken out for railroad right-of-way)
○ Commercial Enterprise (Excludes Structures to be taken out for railroad right-of-way)
70 L_{dn} (Day-Night Average Sound Level)
Avoid new construction and/or analyze noise reduction measures
New construction or development should generally not be undertaken

15·6 Projected Noise Contour Levels along North Bank Alignment



15·7 Projected Noise Contour Levels along South Bank Alignment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FEET
ELKO MUNICIPAL AIRPORT
To Winnemucca
Current of Traffic
Proposed West Detour
Current of Traffic
SEWAGE TREATMENT PLANT
Remove West Detour
Proposed Culvert
River Channelization
Proposed Bridge
From Winnemucca
Current of Traffic
Relocated Wye
Relocated Cleanout Track
Existing Diesel
Existing Diesel House Tracks
Storehouse Track
Existing Repair Tracks
8 Classification Tracks
3 Make-Up and Inspection Tracks
Proposed WP Eastbound Mainline
Nevada Freeport Storage
Proposed Drill Track
Union Oil
Arco Oil
Existing Team Track
Freight House Track
Proposed Westbound Mainline
Proposed Bridge
Remove Existing SP Mainline and Siding
Elko Lumber
Phillips
Shell Oil
Texaco Oil
WP Wye Lead
Remove Existing WP Mainline, Siding, and Industry Spur
Alternative River and Railroad Corridor Crossings
Proposed Bridge
Proposed Underpass
Standard Oil
Nevada Freeport Storage
Team Track
To Wells
From Wells
Remove Existing SP Mainline
Proposed Underpass
Civic Center Drive Extension
Future Road
55
60
65
70
75
80
● Dwelling Unit (Excludes structures to be taken out for railroad right-of-way)
● Commercial Enterprise (Excludes Structures to be taken out for railroad right-of-way)
70 L_{dn} (Day-Night Average Sound Level)
Avoid new construction and/or analyze noise reduction measures
New construction or development should generally not be undertaken

15·8 Projected Noise Contour Levels along Silver Street Alignment

proposed overpass. Several existing trailers adjacent to the Fifth Street River crossing will also be affected by noise levels exceeding 70 dBA.

At the Eighth Street Overpass, a trailer park adjacent to Lamoille Road will be affected by L_{10} sound levels exceeding 70 dBA. All other affected areas exceeding 70 dBA are presently occupied by commercial land uses.

At the 12th Street Bridge across the Humboldt River, no residential structure will be affected by L_{10} noise levels exceeding 70 dBA.

MITIGATION MEASURES

To minimize the noise propagated by train operations through Elko, the following mitigation measures are recommended:

1. Select a type of railroad consolidation project which has no grade crossings, thereby eliminating the need for blowing of locomotive air horns at grade crossings.

2. Request the railroads to minimize the use of air horns for other purposes, such as train signaling, relying to the maximum extent on the use of train radio.

3. For any track relocation or consolidation plan, establish land use zoning along the tracks to encourage construction of industrial and warehouse buildings for less noise-sensitive activities. In addition, the City and other local public agencies should concentrate the construction of public-owned warehouse buildings to front on this corridor. These buildings would serve as a noise barrier with low effectiveness because they would not form a continuous shield. Noise could pass through the breaks between buildings and street crossings.

Land use zoning could introduce other less noise-sensitive activities. Four examples in order of increasing sensitivity:

- Commercial: industrial, transportation, communication and utilities
- Motels/hotels, out-of-door spectator sports, neighborhood parks, office buildings, commercial: retail, movie theater, restaurant
- Water-based recreational areas, livestock farming
- Residential

Noise insulation features could be incorporated into construction design of new buildings.

ATTENUATION EFFECT OF BERMS OF VARIOUS HEIGHTS

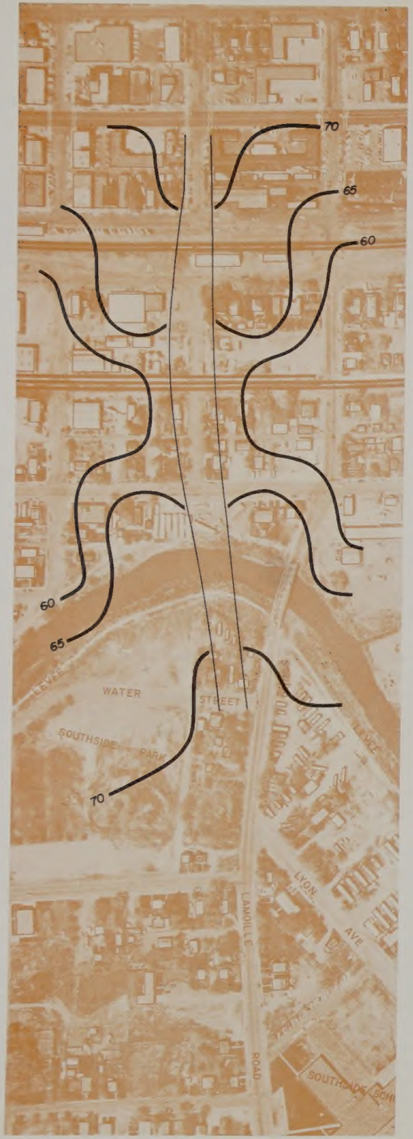
Height of Berm In Feet	Reduction in Perceived Loudness (L_{dn}) Percentage	Numerical	Number of Residences Which 65 L_{dn} Standard Would Not Be Expected
4	10	2 L_{dn}	Proposed plan
11	25	5 L_{dn}	62 houses
15	40	9 L_{dn}	96 houses
20	50	11 L_{dn}	103 houses
30	75	17 L_{dn}	103 houses

4. An analysis was conducted on the cost and effectiveness of acoustic berms along the North Bank alignment to mitigate noise from through railroad operations. Alternative berm designs were investigated, with heights ranging from a minimum of four feet to a maximum of 30 feet, as shown on Exhibit 15-10.

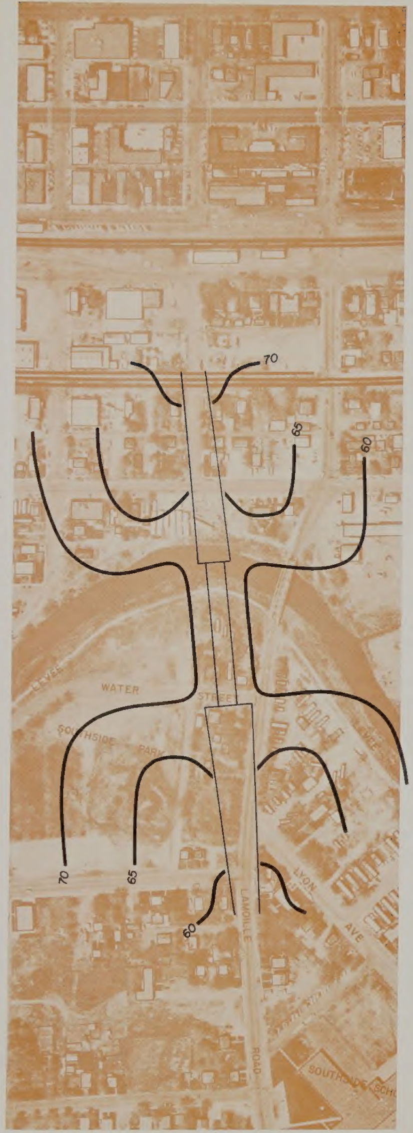
   The potential attenuation of alternative berms was calculated to determine their effectiveness. The following is the percent reduction in the perceived loudness of passing trains that can be expected from each alternative. The reduction is expressed in L_{dn}'s, and the number of houses which would be brought within an acceptable limit of 65 L_{dn}.

   For each berm, designs were explored that used a masonry or Corten steel wall, earth berm with 2:1 slope, and combination earth berm and wall. For each design, landscaping was included to minimize the visual mass of the berm. A preliminary cost estimate was also developed for each design. The cost estimate assumed each berm would extend for a length of 1,600 feet, from First Street to Fifth Street.

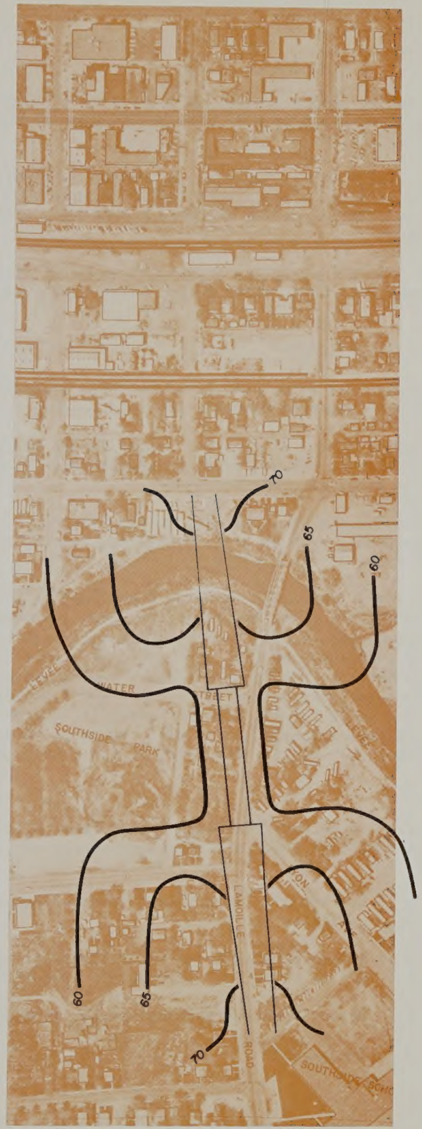
   To augment this analysis a sample telephone survey was conducted in areas affected by the berm to determine the effect of reducing train noise on land values. Five individuals were contacted in this survey. The general feeling among these individuals was that a reduction of 25 percent or less in train noise would not have an appreciable effect on land values. They felt, however, that a 75 percent reduction would be worth



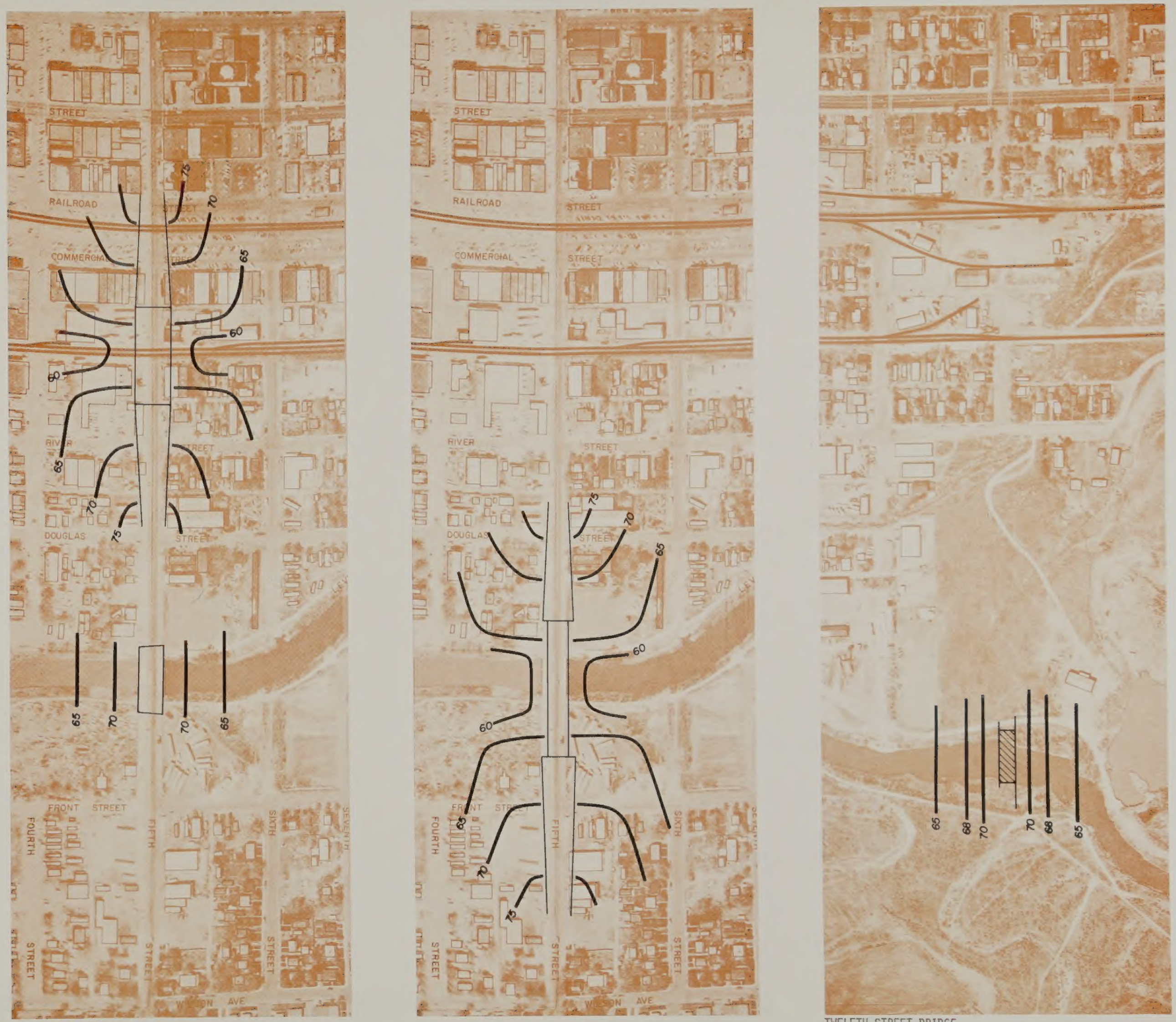
EIGHTH STREET OVERPASS - SILVER STREET



EIGHTH STREET OVERPASS - NORTH BANK



EIGHTH STREET OVERPASS - SOUTH BANK



FIFTH STREET OVERPASS - SILVER STREET

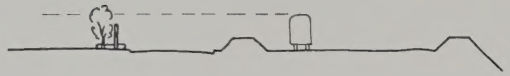
FIFTH STREET OVERPASS - NORTH BANK, SOUTH BANK

TWELFTH STREET BRIDGE

15·9 Projected Vehicular Noise Levels on Elevated Structures

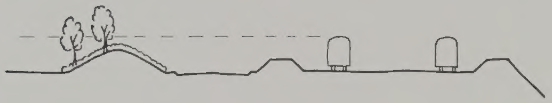
15·10 Comparative Cross-Sections and

11' ACOUSTIC BERM



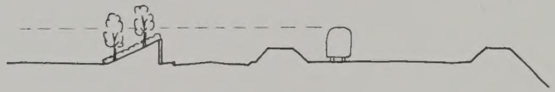
Wall

Corten Steel	$39,600
Landscaping	7,000
Right of Way	1,750
	$48,350



Earth Berm

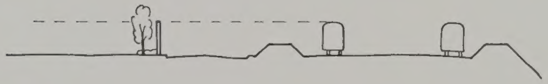
Fill	$17,645
Landscaping	34,160
Right of Way	7,822
	$59,627



Earth Berm and Wall

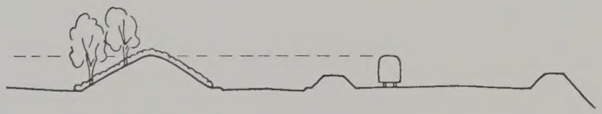
Wall	$39,600
Fill	8,822
Landscaping	17,080
Right of Way	3,911
	$69,413

15' ACOUSTIC BERM



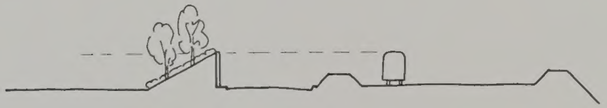
Wall

Corten Steel	$54,000
Landscaping	10,500
Right of Way	1,750
	$66,250



Earth Berm

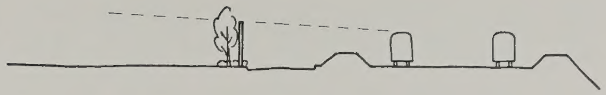
Fill	$32,812
Landscaping	49,700
Right of Way	10,675
	$93,187



Earth Berm with Wall

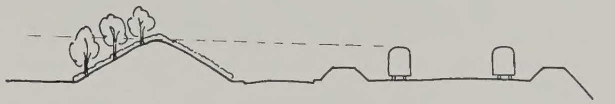
Fill	$ 16,406
Wall	54,000
Landscaping	24,850
Right of Way	5,337
	$100,593

20' ACOUSTIC BERM



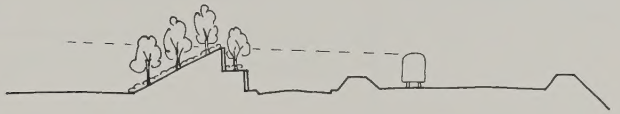
Wall

Corten Steel	$ 72,000
Landscaping	10,500
Right of Way	1,750
	$ 84,250



Earth Berm

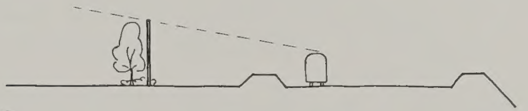
Fill	$ 58,327
Landscaping	55,986
Right of Way	14,227
	$128,540



Earth Berm with Wall

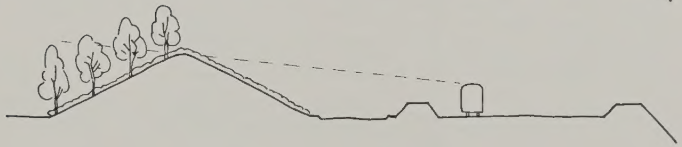
Fill	$ 42,281
Walls	72,000
Landscaping	45,500
Right of Way	8,890
	$168,671

30' ACOUSTIC BERM



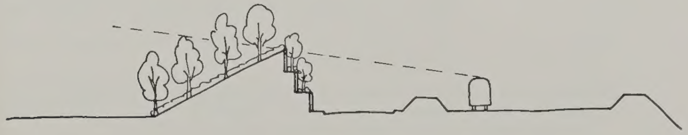
Wall

Corten Steel	$108,000
Landscaping	17,500
Right of Way	1,800
	$127,300



Earth Berm

Fill	$131,250
Landscaping	90,993
Right of Way	21,350
	$243,593



Earth Berm with Wall

Fill	$ 72,551
Walls	108,000
Landscaping	48,993
Right of Way	13,338
	$246,879

Costs for Acoustic Berms and Walls of Various Heights

NOTE:

Cost estimates shown are exclusive of acquisition costs of improved properties, relocation expenses, protection or relocation of underground utilities, engineering, and incidentals about $50 per year in increased city taxes.

The visual impacts from these berms could be mitigated through landscaping. The impacts would be most pronounced adjacent to the first row of housing, where the berm would appear as a visual barrier between the residences and the view of the river and nearby mountains beyond. An earth berm, however, could also be used for bicycle or pedestrian circulation.

It appears that the 30-foot berm is the only height which, in the opinion of local residents, would have a significant beneficial economic effect on adjacent properties. Such a barrier, however, would require an additional right-of-way width of as much as 120 feet, would necessitate the acquisition of additional homes and businesses, would cause problems of access or relocation of underground drainage and utility lines, and would constitute a visual barrier. It is concluded, therefore, that the benefits to be gained from attenuation of railroad noise by the high berm would not be commensurate with these other serious drawbacks and disadvantages to the community.

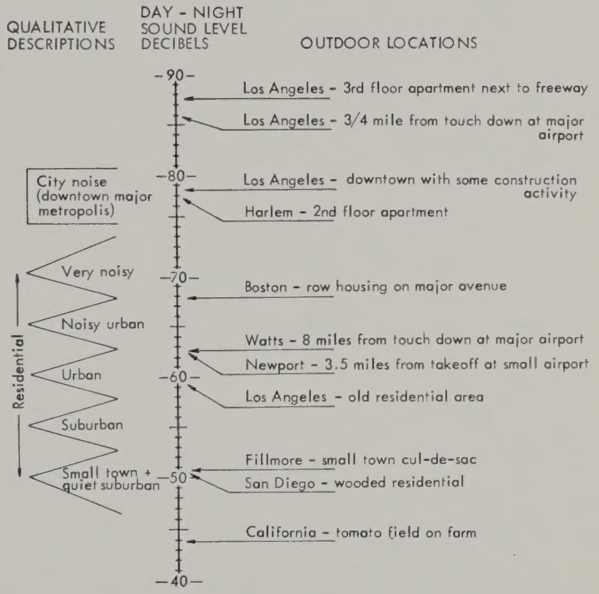
The right-of-way requirements of the 30 foot-high berm would require the additional relocation of 25 families for the North Bank alignment.

5. Use of continuous welded rail for main line tracks to eliminate the "clickety clack" associated with rail with bolted joints.

THE EVALUATION OF NOISE EXPOSURE

The following diagrams and tables have been included to give an overview to the noise contours recorded for the existing conditions and proposed alternative within Elko. A standard of 65 outdoor day-night average sound level (L_{dn}) has been used to denote a maximum sound level that should not be exceeded for residential areas and a standard of 75 exterior noise level that should not be exceeded in commercial/industrial areas.* These standards reflect maximum sound levels that can be experienced without causing undue distraction to normal activities. In the noise contours included for existing conditions and proposed alternatives, dwelling units which experience exterior sound levels exceeding 65 L_{dn} are indicated by a filled circle and commercial/industrial buildings experiencing exterior sound levels exceeding 75 L_{dn} are indicated by an open circle.

Exhibit 15-11 has been included to further explain the meaning of these standards. The scale shows various day-night averaged sound levels with an accompanying description of typical areas where these conditions have been measured. For example, the 65 L_{dn} maximum sound level used in the Elko study is termed on this diagram "noisy urban" and is similar to the noise experienced in row housing along a major avenue in Boston, Massachusetts. Presently 120 dwelling units within Elko experience noise levels within this range (65-70 L_{dn}). There are currently 156 dwelling units within Elko exposed to noise levels between 70-80 L_{dn}. This is similar to what would be experienced in downtown Los Angeles with some construction activity or outside a second floor apartment in Harlem, New York.


QUALITATIVE DESCRIPTIONS
DAY - NIGHT SOUND LEVEL DECIBELS
OUTDOOR LOCATIONS
90
Los Angeles - 3rd floor apartment next to freeway
Los Angeles - 3/4 mile from touch down at major airport
City noise (downtown major metropolis)
80
Los Angeles - downtown with some construction activity
Harlem - 2nd floor apartment
Very noisy
70
Boston - row housing on major avenue
Noisy urban
Residential
Watts - 8 miles from touch down at major airport
Newport - 3.5 miles from takeoff at small airport
Urban
60
Los Angeles - old residential area
Suburban
Fillmore - small town cul-de-sac
Small town + quiet suburban
50
San Diego - wooded residential
California - tomato field on farm
40

Information on levels of environmental noise requisite to protect public health and welfare with an adequate margin of safety. Prepared by the U.S. Environmental Protection Agency, Office of Noise Abatement and Control, 1974

15-11. EXAMPLES OF OUTDOOR DAY-NIGHT SOUND LEVEL IN dB (re 20 MICROPASCALS) MEASURED AT VARIOUS LOCATIONS

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*Noise in San Francisco Department of City Planning, City and County of San Francisco, July, 1974. Page 34.

Table 15-4 has been included to give a greater perspective on the relative frequency in which noise levels are experienced by urban populations within the United States. 81 percent of the population experiences average day-night noise levels in excess of 50 Ldn, while 26 percent experience noise levels in excess of 70 Ldn.

Table 15-5 shows the relationship between indoor and outdoor noise levels caused by the attenuation of outdoor noise by the exterior shell of the house. In a cold climate similar to Elko's noise will be attenuated 17 dBA when windows are open, and 21 dBA when windows are closed.

The final diagrams explain the typical noise exposure pattern for an office worker, housewife, and school child. The unit of measurement in these diagrams is a noise equivalency rating over a 24 hour period (L eq 24) which is roughly similar to the day-night average sound level (Ldn), the unit of measurement used in the noise contours for Elko. These profiles, then, give a general description of the noise levels commonly experienced by urban populations.

Table 15-4

ESTIMATED PERCENTAGE OF URBAN POPULATION (134 MILLION)
RESIDING IN AREAS WITH VARIOUS DAY/NIGHT NOISE LEVELS
TOGETHER WITH CUSTOMARY QUALITATIVE DESCRIPTION OF THE AREA

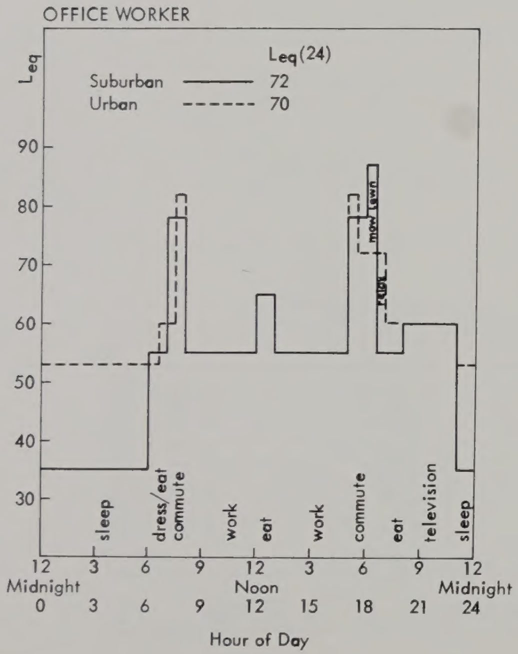
Description	Typical Range Ldn in dB	Average Ldn in dB	Estimated Percentage of Urban Population	Average Census Tract Population Density, Number of People per Square Mile
Quiet Suburban Residential	48-52	50	12	630
Normal Suburban Residential	53-57	55	21	2,000
Urban Residential	58-62	60	28	6,300
Noisy Urban Residential	63-67	65	19	20,000
Very Noisy Urban Residential	68-72	70	7	63,000

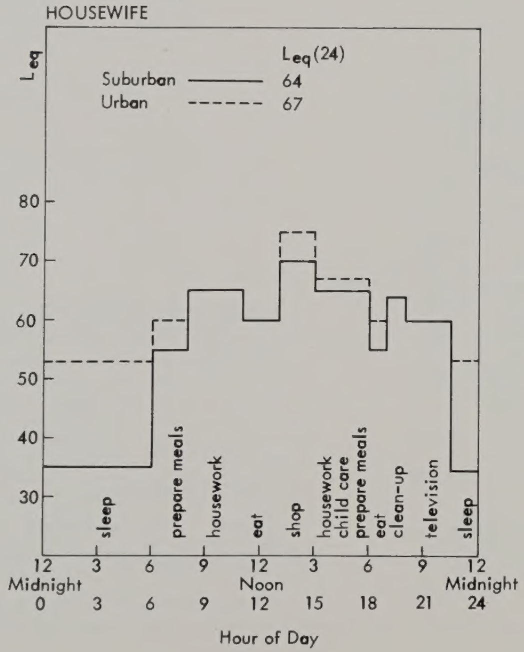
Table 15-5

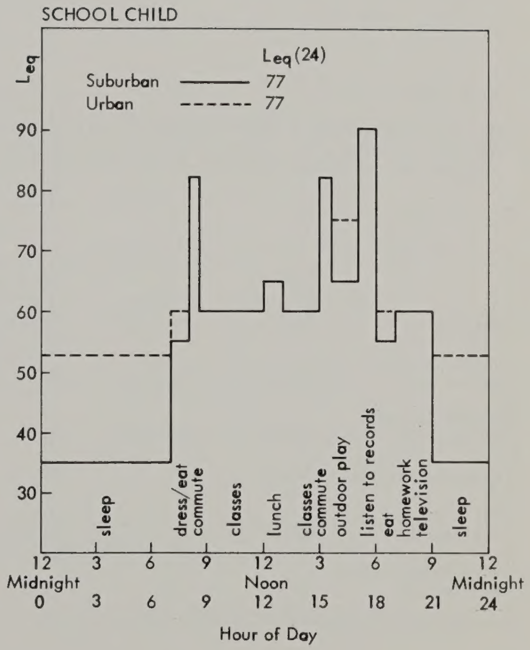
SOUND LEVEL REDUCTION DUE TO HOUSES* IN WARM AND
COLD CLIMATES, WITH WINDOWS OPEN AND CLOSED

	Windows Open	Windows Closed
Warm Climate	12 dB	24 dB
Cold Climate	17 dB	27 dB
Approx. national average	15 dB	25 dB

*Attenuation of outdoor noise by exterior shell of the house.


OFFICE WORKER
Leq
Leq(24)
Suburban 72
Urban 70
90
80
70
60
50
40
30
sleep
dress/eat
commute
work
eat
work
commute
mow lawn
radio
eat
television
sleep
12 Midnight 0
3
6
9
12 Noon 12
3 15
6 18
9 21
12 Midnight 24
Hour of Day


HOUSEWIFE
Leq
Leq(24)
Suburban 64
Urban 67
80
70
60
50
40
30
sleep
prepare meals
housework
eat
shop
housework
child care
prepare meals
eat
clean-up
television
sleep
12 Midnight 0
3
6
9
12 Noon 12
3 15
6 18
9 21
12 Midnight 24
Hour of Day


SCHOOL CHILD
Leq
Leq(24)
Suburban 77
Urban 77
90
80
70
60
50
40
30
sleep
dress/eat
commute
classes
lunch
classes
commute
outdoor play
listen to records
eat
homework
television
sleep
12 Midnight 0
3
6
9
12 Noon 12
3 15
6 18
9 21
12 Midnight 24
Hour of Day

Section 16

Vibration

INTRODUCTION

Vibration is a source of noise, psychological annoyance and physical discomfort. However, in everyday use of the word "vibration," one means non-audible rather than "solid-borne audio frequency vibrations" (noise). For this reason, "vibration" is treated apart from "noise". Assessing the tolerability of vibration is mainly subjective. Proposed vibration criteria curves are based on fatigue and reduced comfort levels. Field measurements of existing vibration levels caused by train movements were taken and compared with the proposed criteria guidelines. Impacts were subsequently projected to the land surrounding the proposed alignments.

Table 16-1 shows that the existing alignment has a high percentage of residential housing within 200' of the tracks. Land uses beyond this distance from the tracks did not show a perceptible level of vibration with survey methods employed; the natural frequency vibration of the ground was greater than that attributed to the train.

MEASURING VIBRATION LEVELS

Field measurements were taken at twelve locations at 50' intervals (cross sections) from the track. (See Appendix 4C, "Vibration Measurement Methodology," for technical procedure and instrumentation.)

The measurement results show the amount of vibration in various frequency ranges. The frequency spectrum shows a high proportion of vibration in the lower frequencies.

OPERATING FEATURES AFFECTING LEVEL OF VIBRATION

The predominance of low frequency vibration is due mainly to the locomotive and switch engines. These engines are the major source of all

Table 16-1

EXISTING LAND USES NEAR RAILROAD

Inventory of Land Uses	Distance From Track	
	50'	50'-200'
Dwelling Units	43	59
Commercial/Retail Enterprises	5	31
Commercial/Industrial Enterprises	4	25
Motels/Hotels	1	2

vibration frequencies. The secondary sources are the freight cars. The empty rail cars bounce considerably more than loaded cars. The bolted rail joints increase this vibration due to bouncing. Flat spots on freight car wheels also cause significant vibration.

EXISTING VIBRATION IMPACT LEVELS

Criteria levels shown in Exhibits 16-1 and 16-2 show that the critical vibration area lies in the low frequency range of 0 to 100 Hertz, which is significant in the frequency spectrum of trains. An accelerating locomotive measured a maximum of 0.01g t 31.5 Hertz. According to Exhibit 16-1, this level is acceptable more than eight hours a day but it borders on the "reduced comfort" zone. It would have to exceed 0.06g to be a health hazard. In Exhibit 16-2, 0.01g at 31.5 Hz lies near the border of "class D" -- very perceptible. This means that living in dwellings 50 feet from tracks with prolonged interruptions results in a tolerable level of exposure, although rather noticeable.

Exhibit 16-2 classifies the criteria ranges of equal perception and tolerability below 100 Hz. The chart excludes frequencies above 100 Hz since vibrations in the higher range are perceptible mainly on the skin and depend upon the part of the body and the damping layers (clothes, etc.).

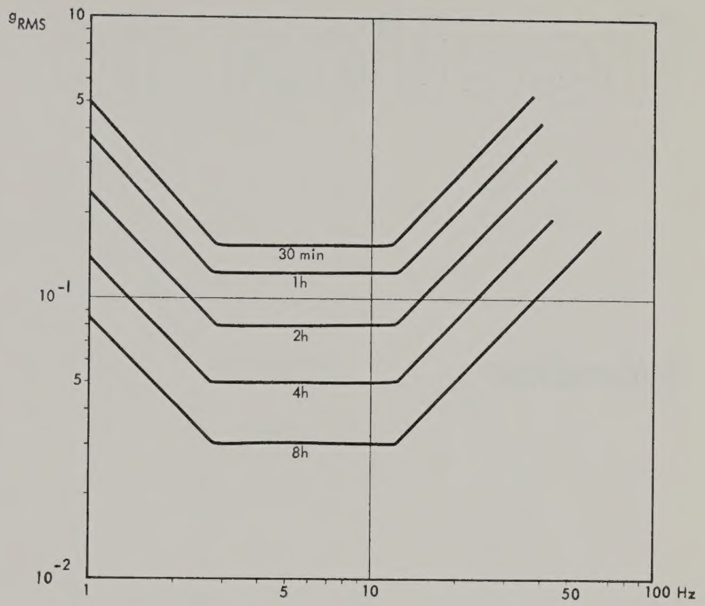
None of the measurements taken at the 12 sites within 200 feet of the track show vibration levels that exceed the eight hour exposure level of Exhibit 16-1. The measurements actually fall far below. They can be classified by the criteria levels of Exhibit 16-2. Thus, at 50 feet from the track, the measurements lie in the following Exhibit 16-2 categories: "E, strongly perceptible," "D, very perceptible," "C, perceptible," "B, barely perceptible" and "A, threshold of perception." With increasing distance from the track, there is a decreasing percentage of readings in the B, C, D and E and higher vibration level categories. At 200 feet, the vibration is barely perceptible.

The effects of vibration may be more noticeable in some structures than others due to differences in foundation materials and soil types. The vibration may be quite perceptible (windows rattling in many structures) with the typical low frequency range of train vibrations.

PROJECTED VIBRATION IMPACT LEVEL

The elimination of low speed limits within town will decrease the significant amount of vibration caused by accelerating locomotives. Running at a constant higher speed, a locomotive produces less vibration in the most noticeable, low frequency range.

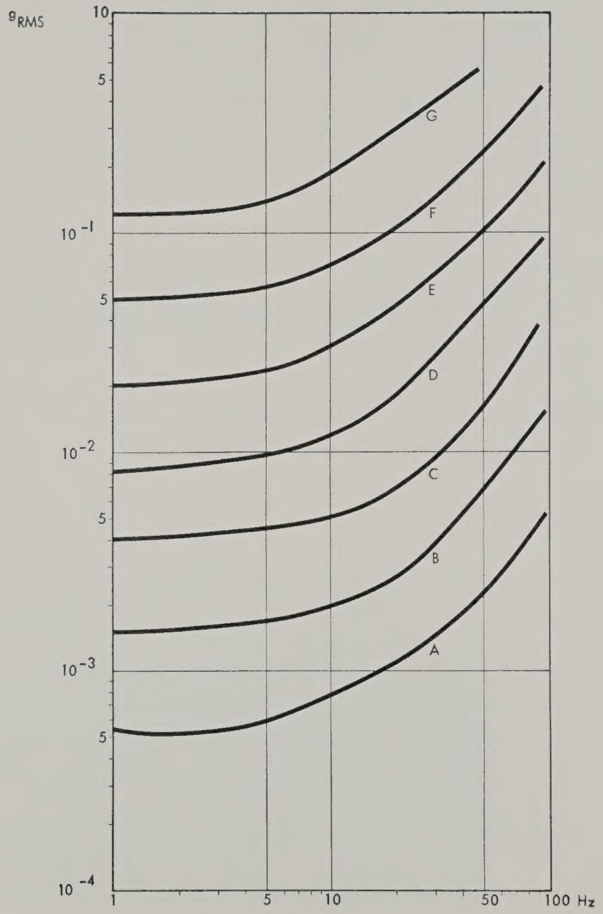
The areas surrounding the new alignments may include a higher proportion of commercial, recreational and industrial uses than the existing alignment.



16-1. VIBRATION EXPOSURE CRITERIA CURVES INTERNATIONAL STANDARDS ORGANIZATION PROPOSAL

Source: Broch, Jens Trampe, Mechanical Vibration and Shock Measurements, K. Larsen + Son, Soborg, Denmark May 1972, page 73

The International Standards Organization has proposed some vibration criteria curves in terms of exposure time versus increasing acceleration (of vibration) levels. Exceeding the exposure curves invokes "noticeable fatigue" and decreased job proficiency in most tasks. Doubling (6 dB) the "fatigue-decreased proficiency" curves would approach the health hazard level. The "reduced comfort" boundary lies about one third (10 dB) below the stated levels. The criteria recommend guidelines rather than establish firm boundaries. They are intended for healthy, normal people living under normal stress of an average working day with normal living routines.



VIBRATION RATING

Level	Description of the Perception	Tolerance of Exposure During
A	Not Perceptible	Threshold of perception
B	Barely Perceptible	
C	Perceptible	Living in dwellings with short (about 10 min.) or without interruptions
D	Very Perceptible	Living in dwellings with prolonged (about 1 hr.) interruptions. (The relation of pauses to time of oscillation lies between 0.1 and 1.0.)
E	Strongly Perceptible	Physical labor without interruption
F	Very Strongly Perceptible	Physical labor with short interruptions
G	Differentiated Judgement no longer possible	Rather long trips in trains and trucks. Physical labor with prolonged (about 1 hr.) interruptions
H		Driving in self-propelled working machines. Trips in trains and trucks for a short time.

16-2. EQUAL PERCEIVED INTENSITY VIBRATION CURVES

Source: Von Gierke, H. E.,"Noise and Vibration Exposure Criteria", Archives of Environmental Health, Volume II, September 1965, p. 336

The density of residential housing adjacent to the new alignments may not be as great as the present level near Railroad/Commercial and Silver Streets. The future affected land uses may not be as sensitive since residential housing is more sensitive to noise and vibration than commercial, recreational, or industrial uses.

SILVER STREET ALIGNMENT

This alignment shows the highest proportion of residences and commercial activities within the critical 200 feet from the tracks. Refer to Table 16-2.

Table 16-2

PROJECTED LAND USES NEAR ALIGNMENTS*

	ALIGNMENT AND DISTANCE FROM TRACK					
Inventory of Land Uses	Northbank		Southbank		Silver St.	
	50'	50-200'	50'	50-200'	50'	50-200'
Dwelling Units	0	40	0	16	9	23
Commercial/Retail Enterprises	0	0	0	0	0	15
Commercial/Industrial Enterprises	0	2	0	0	2	5
Motels/Hotels	0	0	0	0	0	0

NORTHBANK ALIGNMENT

Within 50 feet of the tracks, this alignment will not affect any structures. However, within 200 feet of the tracks, it impacts the highest number of residences compared to the other proposed alignments.

SOUTHBANK ALIGNMENT

The Southbank alignment has the least amount of land use within 200 feet of the track which could be affected by vibration.

SUMMARY OF VIBRATION IMPACT

The structures which would be most subjected to vibration lie within 50 feet of the track. The existing alignment has the highest number of dwelling units (43) within this category. The Silver Street alignment would have the next highest (9). These two alignments have the highest concentration of use within 200 feet (but greater than 50 feet) of the tracks also. The existing alignment has 59 dwelling units and Silver Street alignment has 54 dwelling units and commercial enterprises. This is much greater than 40 dwelling units within the entire 200 feet from the Northbank tracks and the 16 dwelling units within 200 feet of the Southbank tracks.

MITIGATION MEASURES

The replacement of the bolt-jointed track with welded track will serve to decrease the vibration and noise considerably. The majority of the rail car vibration is due to the pumping action from the cars moving across the low joints of the track. In contrast, the continuous welded rail will provide smooth movement along the tracks, thus eliminating much of the vibration.

Elimination of the low speed limits within town and acceleration of locomotices at the speed limit posts would reduce the vibration caused by the locomotive, the major vibration source.

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*Excludes Land Use to be displaced by alignment

Section 17

Natural Vegetation

INTRODUCTION

The major influences on the natural vegetation in the project area are the availability of water and the nature of the topography and soils. A clear distinction can be drawn between vegetation relating to standing water and seasonally moist soils, and vegetative types which are sustained by normal periodic rainfall. Exhibit 17-1 shows these two basic vegetative associations which can be categorized as wetlands and open range vegetation.

Little of the present natural vegetative cover can be regarded as climax vegetation, and many non-native species have been brought into the area as a result of man and animal activities over the past 130 years. This is especially true of some of the grasses and nuisance plants. On the other hand, the stream banks of willow, cat-tails, and grasses, sedges and rushes are largely native species. One notable characteristic of the wetlands area is that it is a fluctuating environment, as the surface and ground water levels change the nature of the plant communities also change. The intermixing of the two habitats, and the changes which take place through natural processes, make detailed vegetative mapping difficult.

VEGETATIVE ASSOCIATIONS

Ten feet above the eroded and continually changing banks of the Humboldt River, species regarded as open range plants may occur only a few feet laterally from species limited to wetlands environments. Appendix 3-C lists the various plants growing within the project area.

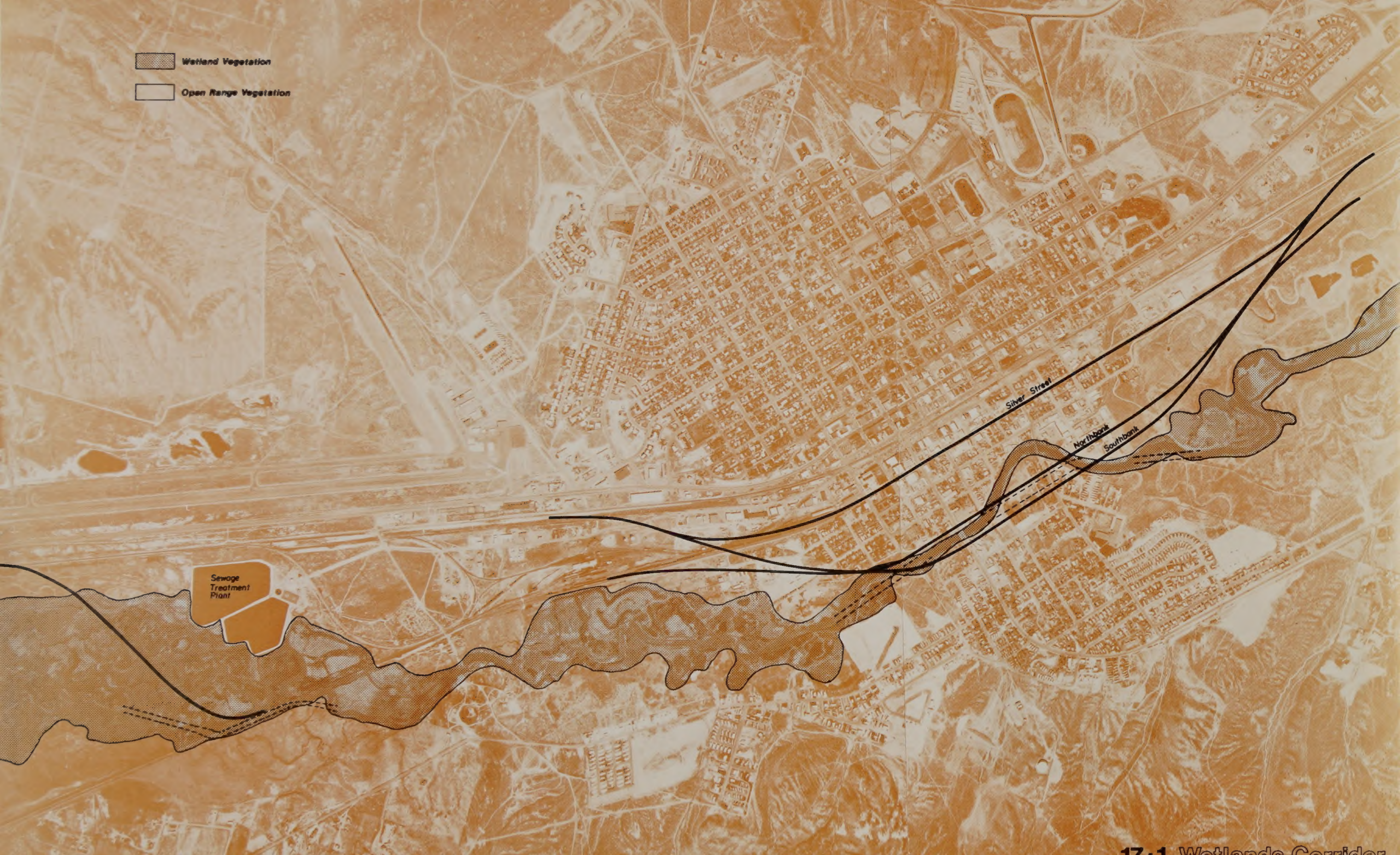
Typical of the open range plants are Greasewood and Rabbitbrush (shrubs); Salt Grass, Giant Wildrye, Foxtail Barley and Smooth Bromegrass (grasses); Hairy Sagebrush, and Liquorice, Thistle and Field Bindweed (Perennial and Biennial Forbs); and Fivehook Basia, Tumbleweed and Knotweed (Annual Forbs).

In the moist soils of the wetlands area, grasses, sedges and rushes include Sedge, Wiregrass, Bluejoint, and Cat-tail; shrubs are mainly composed of Narrow Leaf Willows; perennial and biennial forbs include Wild Iris and Smartweed; and annual forbs include Little bur and Water Plantain.

The plant community of the wetlands area, except the section protected by dikes -- from approximately Sharp's concrete plant on the west to Eleventh Street on the east -- is constantly in a state of change due to changes in the river system.

The wetlands area is a complicated ecological system composed of several water-related features including:

- Ponds; fresh, open water with a fairly stable level
- Vernal Pools and Oxbows; with seasonal intermittent standing water
- Live Streams; characterized by flowing water
- Streamside Marsh; margins of flowing water
- Riparian Lands; wet soil adjacent to water



17·1 Wetlands Corridor

- Seasonally wet floodlands

These features particularly have significance for birds, mammals, fish, and other aquatic life. This significance, and the likely impacts of the project on fish and wildlife, are discussed more fully in Section 18. It is appropriate here however to point out some of the vegetative characteristics associated with these features.

Ponds usually have bullrushes associated with them and pond weed. Willows are found around and in the borders of the ponds. The vegetation has significance for microscopic aquatic life, fish, and amphibians such as bullfrogs.

Vernal pools, bodies of standing intermittently stranded water, are found throughout the wetlands area, especially at the eastern end of the study area and at the western end in the vicinity of the sewage treatment plant. Frequently, they consist of old ox-bows which tend to dry up seasonally. The natural vegetation usually consists of bullrushes, cat-tails, sedge and often willows around the edge. The vegetation and insect life helps support bird life, including ducks for a limited time, and small mammals.

The river and live streams provide habitat for microorganisms and fish (discussed in Section 18), while the streamside willows standing in shallow water harbor song birds and contribute terrestrial food for fish and other aquatic life.

Vegetation characteristic of streamside marsh areas includes willow, grasses and cat-tails and has similar significance for fish and wildlife as "live-stream" vegetation.

Riparian lands are characterized by grasses, sedge, rush, and iris. They support some song birds and shore birds, and provide waterfowl nesting sites, and limited grazing for livestock.

Vegetation associated with seasonally wet flood lands includes iris, yarrow, cinquefoil, grasses and fiddleneck. These areas provide livestock pasture and bird nesting sites.

THE VALUE OF EXISTING VEGETATION

The main values associated with the existing natural vegetation are: limited economic significance for grazing; soil stabilization, especially along stream and river banks; scenic value; and wildlife habitat, especially for birds.

The economic value of the natural vegetation is limited by its close proximity to the City, with resultant problems for grazing (human concentration, pets, construction, etc.) and by the nature of the vegetation itself.

Many of the species of plants along the floor of the Humboldt River valley are noxious or poisonous for the livestock raising which occurs on the fringes of the project area. These include: Foxtail Barley, Wild Iris, Water Hemlock, Halogeten and Cocklebur. Other species, such as Greasewood, Sagebrush and Cheat Grass are of low economic value for grazing during most of the year. Grazing is presently limited to a small amount of horse grazing south of the existing railroad yard, and some cattle grazing at both the east and western ends of the project. The only area with any real significance for cattle grazing is the area southwest of the City's sewage treatment plant.

Both the wetlands and open range vegetation associations are extremely fragile and soils are highly susceptible to erosion. The natural vegetation performs an important function in reducing potential erosion. The stream banks throughout the area are constantly being eroded and the natural vegetation, particularly willows and grasses, help reduce this problem. However, natural erosion, particularly during the spring floods, often removes the vegetation in both the wetlands area and the open range on the edge of the wetland, where species such as Sagebrush and Rabbit Brush get swept away. The range lands are particularly fragile and subject to both wind and water erosion. Furthermore, the more the range lands are disturbed, the greater the erosion and sedimentation impacts on the river.

IMPACTS

Although from a vegetation standpoint there is nothing that can be considered unique within the project area, the construction period and the completion of the project will result in some reduction of natural vegetative cover and could have attendant problems of temporary increases in siltation, temporary disruption of wildlife habitat and possible loss of aesthetic values.

- Construction of the project will involve removal of an estimated 20 acres of open range vegetation and an estimated 25 acres of wetland vegetation with the North and South Bank alternatives.

- Depending upon the alternative adopted, there could be two river channelizations of 1,500 feet and 3,000 feet which would result in the temporary removal of streamside vegetation.

- The possible channelization in the center of Elko will likely result in the temporary elimination of willows and a few other trees (Elm, Poplar) in this area. If the area is to remain in open use, the willows are likely to be slow in re-establishing along the new channel.

- Construction access and equipment storage will result in the temporary disturbance of five to ten acres of natural vegetation.

- In areas which have been temporarily disturbed it is likely that the natural vegetation will re-establish itself with grasses and sage in a few years. However, they are likely to be preceded by some less desirable vegetative species, e.g., thistles, cheat grass.

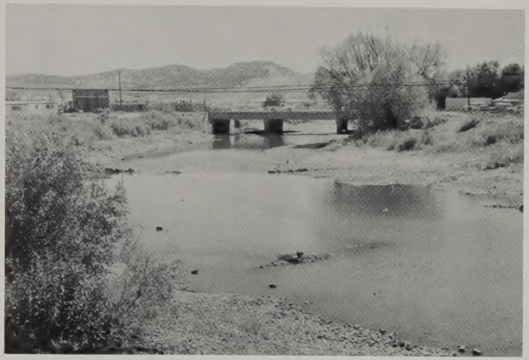
- Vegetation removed as a result of the construction of the project will likely take several seasons for complete restoration along the border of the right-of-way. Within this narrow band, some bird nesting sites would be eliminated.

- East of the possible Twelfth Street Underpass, there would be no significant impact on vegetation apart from the elimination of a narrow strip of largely sagebrush and a very small amount of streamside vegetation at the Twelfth Street Underpass.

- The channel modification through the City will result in the removal of nearly all natural vegetation along the river between approximately First Street and Eleventh Street. This will result in some slight increase in river temperature, less vegetative nutrients for aquatic life and a loss of scenic value, particularly in the vicinity of the main meander in this section.

- The possible channelizations themselves will destroy aquatic and wildlife habitat.

- The natural vegetation around the proposed lake site is essentially barren to the north with thick willows on the south side of the river. From a vegetation viewpoint, it is desirable to maintain the south side of the river in this vicinity in a natural state, although this could conflict with future park development plans.



- The section of the proposed project from the proposed lake to the western channelization will involve removing some small areas of wetlands and some open range of little significant value. A small area of marsh and an abandoned oxbow are likely to be filled but they have only slight value for wildlife, birdlife and waterfowl habitat. Most of the more densely vegetative wetlands area would remain south of the remodeled yard.

- In the vicinity of the Elko sewage treatment plant the Humboldt River follows an extensive system of meanders, bordered by considerable wetland vegetation. Replacement of this approximately one and a half miles of river and oxbows by a channel of 3,000 feet should be avoided since channelization would bring about an abrupt change in the natural vegetation and wildlife characteristics of this area. Discussion of mitigation of the possible channelization near the sewage treatment plant is contained in Sections 13 and 18.

- The general area in the vicinity of the sewage treatment plant is the most important vegetative area likely to be impacted by the proposed project. The area is a typical wetland area with dense willow and grasses. It has value as waterfowl habitat, and for small birds. It is relatively inaccessible so remains fairly undisturbed although parts of it are used seasonally for limited cattle grazing. If the entire normal river flow, or most of it, was diverted, it would have a major impact on the natural vegetation of the area though it is possible that the area could still be used for grazing.

- The western-most channelization itself will eliminate 10 acres of wetland and open range vegetation; and the detour track which crosses the wetlands area will eliminate an estimated 2 acres primarily composed of wetlands.

MITIGATION

- To minimize erosion problems, the grasses in both the open range and wetlands areas, and the willows in the wetlands, which could be temporarily disturbed during careless construction, will be protected.
- Areas disturbed by construction activity will be reseeded with grasses. This will include any areas temporarily impacted for construction access, the area around the proposed gravel source, any overburden which is spread out, and areas adjacent to the tracks in open "country."
- Willow slips will be planted along any channelization or bank alteration to assist in water temperature control, improve aesthetics and soil stability, and provide feed for aquatic life.
- Wherever possible overhanging vegetation along the river will be preserved.
- A planned landscaping program will accelerate the restoration with desired trees, shrubs and grasses.

Table 17-1

PLANTS GROWING ALONG THE HUMBOLDT RIVER VALLEY, TWO MILES EAST AND WEST OF ELKO

Common Name	Scientific Name
Trees	
Box Elder	Acer negundo
Elm	Ulmus parvifolia
Russian Olive	Elaeagnus angustifolia
Silver Leaf Poplar	Populus alba
Shrubs	
Greasewood	Sarcobatus vermiculatus
Rabbitbrush	Chrysothamnus nauseosus
Golden Current	Ribes aureum
Sagebrush	Artemisia tridentata
Wild Rose	Rosa woodsii
Narrow Leaf Willow	Salix exigua
Grasses, Sedges, Rushes	
Salt Grass	Distichlis stricta
Alkali Sacaton	Sporobulous airoides
Giant Wildrye	Elymus condensatus
Mat Muhly	Muhlenberggia squarrosa
Scratch grass (Alkalai Muhly)	Muhlenberggia asperifolia
Foxtail barley	Hordeum jubatum
Crested wheatgrass	Agropyron cristatum
Nevada Bluegrass	Poa Nevadensis
Sedge	Carex (species)
Wiregrass	Juncus (species)
Bluejoint	Elymus triticoides
Meadow Barley	Hordium brachyantherum
Smooth Bromegrass	Bromus inermis
Quackgrass	Agropyron repens
Red Top	Agrostis alba
Timothy	Phleum pratense
Sandberg Bluegrass	Poa secunda
Kentucky Bluegrass	Poa pratensis
Squirreltail	Sitanion hystrix
Cheat grass	Bromus tectorum
Bulrush	Scirpus robustus
Cat-tail	Typha latifolia
Perennial and Biennial Forbs	
Hairy sagebrush	Artemisia vulgaris
Poverty weed	Iva axillaris
White top	Cardaria draba
Cinquefoil	Potentilla canadensis
Cinquefoil	Potentilla norvegica
Wild Iris	Iris missouriensis
Yarrow	Achillea millefolium
Liquorice	Glycyrhizza lepidota
Gumweed	Grindelia squarrosa
Horehound	Marrubium vulgare
Prickley phlox	Phlox douglasii
Canadian thistle	Cirsium arvense
Bull thistle	Cirsium vulgare
Wild Onion	Allium (species)
Dandelion	Taraxacum officinale
Aster	Aster chilensis
Black Medic	Medicago lupulina
White clover	Tritolium repens
Curly dock	Rumex crispus
Common Mallow	Malva neglecta
Field binweed	Convolvulus arvensis
Buckhorn plantain	Plantago lanceolata
Broadleaf plantain	Plantago major
Lupine	Lupinus (species)
Water hemlock	Cicuta douglassii
Sneezeweed	Helenium Bigelovii
Smartweed	Polygonum coccineum
Annual Forbs	
Fivehood bassia	Bassia (Echinopsilon) hyssopifolia
Kochia (Red Sage)	Kochia scoparia
Halogeton	Halogeton glomeratus
Yellow foxtail	Setaria lutescens
Little bur	Ranunculus testiculatus
Tumble weed (Russian thistle)	Salsola kali
Sunflower	Helianthus annuus
Cluster tarweed	Madia glomerata
Lambsquarter (White pigweed)	Chenopodium album
Redroot pigweed	Amaranthus retroflexus
Fiddleneck	Amsinkia (species)
Shepherds purse	Capsella bursa-pastoria
Tumble mustard	Sisymbrium altissimum
Knotweed	Polygonum argyrocoleon
Purple filaree	Erodium acutarium
Henbit (Giraffe Head)	Lamium amplixicaule
Purple Mustard	Chorispora tenella
Cocklebur	Xanthium strumarium
Cow cockle	Vaccaria segetalis
Pepperweed	Lepidium virginicum
Yellow flower pepperweed	Lepidium perfoliatum
Annual bluegrass	Poa annua
Prostrate Pigweed	Amaranthus blitoides
Miners lettuce	Montia perfoliata
Common purslane	Portulaca oleracea
White cockle	Lychnis alba
Falseflax	Camelina microcarpa
Bushy Wallflower	Erysimum repandum
Stickleaf	Mentzelia albicaulis
Cutleaf nightshade	Solanum triflorum
Common Mullein	Verbascum thapsus
Water Plantain	Sagittaria cuneata

Note: This is an incomplete list. Other minor plants can be found during the active growing season.

Source: Compiled by Irving Hackett, Elko County Extension Agent, University of Nevada in 1972-73, with minor revisions and additions in 1974.

Section 18

Animal Life

AQUATIC MICRO-ORGANISMS

Introduction

Aquatic micro-organisms are significant because they represent one of the beginning points in the food chain for fish and wildlife. Little information already existed on the biological characteristics of the Humboldt River in Eastern Nevada which would provide guidelines for making estimates of the potential environmental impact of channelization or other disturbance of the river. Accordingly, special limnological surveys were conducted to estimate the potential environmental impacts of the proposed railroad relocation and associated channelization. The studies were conducted to provide an evaluation of the environmental impact during high river levels of June compared to the lower river levels, higher temperatures, and slower current rates of August.*

Plankton samples and bottom samples were collected by ordinary limnological methods, or modifications of methods. Identification of organisms employed standard reference works. Sample points were chosen both outside and inside the project area to give a representative picture of the biological conditions of the river. Physical data included estimations of temperature, current velocity, and depth at each sample point. These measurements provided some basis of interpretation as to why various organisms existed in the river.

Existing Conditions

June 1974

For the June study sample points were chosen upstream from the sewage treatment plant, except for one point a substantial distance downstream from the plant. Plankton collections from the river and associated quiet waters yielded 6 genera of blue-green algae, 22 genera of green algae, 17 genera of diatoms, 9 genera of rotifers, 6 genera of cladocerans, 3 genera of copepods including their mauplii larvae, some ostracods, an isopod, some flatworms and roundworms, and nymphs or larvae of four groups of insects. The plankton during the high water stages of the river, with the exception of some diatoms and some green algae, were probably not produced within the river itself, but represented a mingling of plankters produced from other sources such as oxbows, return flow from irrigated fields, or tributaries of the river.

The plankton content during June appeared to be dilute, probably only a few hundred organisms per cubic meter. The plankton seemed to contain no clear indicator organizms because of the contribution from several sources.

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*Full details of the methods and findings of the two limnological surveys, conducted by Dr. David Emerson, Elko, Nevada, are contained in Appendices 3A and 3B.

The bottom environment of the river during June exposed mostly mud or mud-sand bottoms. These bottom types were mostly sterile with the exception of a few slightly productive areas which contained only a few roundworms and dipteran larvae.

August 1974

For the August study sample points were chosen both upstream and downstream from the sewage treatment plant. The flow of the river during mid-August was well under 10 cubic feet per second, compared to the June flow of approximately 800 cubic feet per second. By the end of August, several areas of the river within the project area in Elko were dry.

In the August study major differences were apparent in the limnological characteristics of the river upstream and downstream from the sewage treatment plant. Upstream from the sewage treatment plant Humboldt River plankton during the low water/high temperature/slower current stages of the river were probably produced endogenously; the primary substrates for production were algae masses in static water (primarily *Spirogyra*) or attached to rocks (primarily *Cladophora*). The major changes in river organisms in August compared to June can be attributed to reduced current rates which allow algae to gain a foothold on substrates, and which decrease water turbidity to allow sunlight to reach the bottom; and higher water temperatures which cause increased growth and reproductive rates.

The low water levels during August exposed bottom environments of mud or coarse sand in places, and in many places, rocks. Rock bottoms were usually productive; sand and mud bottoms were almost uniformly negative. Two general types of habitats were examined: lotic or running water habitats which exhibited different characteristics compared to static water habitats. Both habitat types were moderately productive for several types of macro-organisms, mostly immature insects: caddisfly larvae, mayfly numphs, dipteran larvae, and bettle larvae. Caddisfly larvae which require well aerated water were found in abundance in lotic situations, but greatly reduced in number or absent in static water. Mayfly nymphs were found in both situations. Dipteran larvae were mostly confined to static water.

Among the micro-organisms associated with bottom conditions were many which are normally found associated with filamentous algae or with stagnant situations. They included diatoms, protozoans, rotifers, gastrotrichs, a few roundworms, several forms of algae, and a few micro-crustaceans. A greater variety and abundance of micro-organisms was found in static water compared to lotic water.

The river takes on different biological characteristics downstream from the sewage treatment plant. The primary algae found in the river was *Scenedesmus denticulatus* which had its origin in the effluent from the treatment plant. In response to the increased organic material entering the river, and probably to modifications of several chemical factors, populations of rotifers, protozoans, blue-green algae, gastrotrichs, and chironomid larvae were found. These populations differed qualitatively and quantitatively from those upstream. Many of the forms found were typical for stagnant or polluted water.

In areas of running water downstream from the treatment plant, populations of macro-organisms were not changed significantly compared to points upstream; apparently the running water where found is suitable for several insect larvae and nymphs.

Impacts

- The potential impact of the possible channelization on micro-organisms on the stretch of river in the developed part of Elko would be minimal.
- At higher water level, most of the plankton originates in sources other than this section of the river. The bottom environments exposed at this time are unstable and contain few organisms. Rooted aquatic vegetation is sparse, and found in places where slower currents exist. Terrestial vegetation may contribute to the river at high water, but at low water this contribution would be minimal.
- At low water levels, bottom areas of rocks are exposed; these areas are relatively rich with bottom flora and fauna, and a new channel would cause some disturbance. Disturbance of algae forms would be minimal because these plants would be expected to re-establish themselves quickly after rechannelization.
- The possible impact of channelization on micro-organisms on the stretch of the river in the vicinity of the sewage treatment plant would have a greater impact than the easterly channelization.
- The present micro-organism productivity of the river above the plant would be reduced with channelization.
- Due to the increased organic load from the sewage treatment plant, the river downstream from the plant shows different biological characteristics compared to the river upstream, particularly at low river levels. The effluent from the plant results in excessive organic matter in the river with biological indicators of pollution present. Channelization, without relocation of the sewage treatment plant outfall, would result in an undesirable increase of such indicators.

Mitigation

Possible steps which can be taken to reduce any adverse impacts on aquatic micro-organisms include the following:

- Consideration should be given to include rocks of various sizes in bottom material. This would help create ripples and stimulate the re-establishment of bottom flora and fauna.

- The limnology subconsultant also recommends that "a suitable gradient be determined to maintain current flows in several areas during low water stages of the river." However, in the opinion of the project engineers, the existing gradient change is so slight that this recommendation may not be feasible.

- Seeding and planting of grasses and shrubs or trees along the new banks.

- Maintaining existing oxbow areas which have potential in the production of pond-type fauna and flora, and as a refuge for wildlife.

- Incorporation of factors which could make the new river channel more productive than the existing channel, but recognizing that increased river productivity could result in an increase in insect pests near populated areas.

- Maintain a desirable minimum flow in meander areas of the river to ensure continued productivity of micro-organisms.

FISH LIFE

The main fishery resources of the project area are the Humboldt River itself and some ponds within the area. The most significant of the ponds are the old gravel pits near the proposed Twelfth Street underpass. Some are periodically connected to the river while others are not. They contain water all-year round and are stocked periodically with blue gill, bass and catfish. The ponds in the vicinity of the old Ice House, east of 12th Street extended, are particularly significant. With normal care during construction, the project should result in no adverse impacts on these resources.

At one time the Humboldt River supported cutthroat trout and produced excellent fishing when the white man first traveled the country in the 1840's. The area then was described as "long grassy valleys, with clear silvery streams of water." Since 1900 fishing conditions have deteriorated and cutthroat have not been found in the main river since the 1930's. Trout have been eliminated by many years of deteriorating watersheds, poor water quality, and primitive irrigation practices.

"Bullhead catfish were planted and established in the Humboldt River early in this century. In about 1956 initial attempts were made to establish warm-water fish species such as smallmouth bass, white crappie, largemouth bass, channel catfish, white catfish, blue gill, white bass, and also bull frogs along the river. Sporadic attempts to establish gamefish along the Humboldt River have been attempted every two or three years since this date, but it is just in recent years that evidence indicates some of the activity has been successful in attempts to establish these warm water fish."*

The river is not presently a good fishery resource in the Elko area. The section within the urbanized area of the city, which is confined by dikes constructed in the 1940's and 1950's, particularly is lacking in desirable fish habitat.

Appendix 3C lists the fish species found in the project area. In the project portion of the Humboldt River the more common species are carp, Lahontan tui chub, speckled dace, redshine shiner and the mountain sucker, all of which are non-gamefish. Best successes in these stocking were returned by the channel catfish and bluegill sunfish. Since 1967, a total of 14 catfish have been checked by Nevada Fish & Game Department personnel in angler interviews near Elko. The Department predicts an increase in annual catch in the years ahead, since half the above total was taken in the most recent year.

The sewage treatment plant at this time does not appear to be a limiting factor on fish life, but this may be attributed to the flushing action during periods of high flow. In theory the effluent should be detrimental to game fish. It is probably harmful to some bass, but appears to attract catfish.

Impacts

- Excavation activities would temporarily disrupt the habitat of some fish and other aquatic organisms. In the vicinity of the sewage treatment plant, depending upon water flow volume at the time, the local survival rate of the new hatch could be reduced.

- The Nevada Department of Fish and Game states that excavation of river channels generally has "relatively long term effects on fish population levels." This evaluation appears most applicable to rechannelization in the vicinity of the sewage treatment plant.

- There should be no significant impacts on fish and wildlife values east of the possible Twelfth Street underpass.

- Channelization in both sections of the river will temporarily create certain impacts with adverse effect on micro-organisms, fish and wildlife. Channelization will result in a decrease in river pools and a decrease in fish habitat with less overhanging vegetation in the vicinity of the sewage treatment plants. It will slightly increase stream velocity, which will have an eventual effect on fish life within both the straightened stretch of river and downstream, with more bank erosion and increased siltation. Channelization is likely to lead to a temporary increase in certain chemical parameters, such as sulphates and alkalinity. Sulphates are already high enough to be a limiting factor on fish life.

- The shorter channelization through the urbanized portion of Elko has very limited potential for fish life and the water quality impact is not likely to be so long-lasting here.

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*Source: Nevada Fish and Game Department, "Stream Survey -- Humboldt River, Elko, Eureka and Lander Counties." February 1974.

- If the diversion of the river was necessary to create and maintain the lake, there may also be resultant problems of water rights.

Mitigation

- Construction of any part of the project likely to impact on water quality should be undertaken at periods of low flow to minimize possible sedimentation and turbidity problems. A small settling basin in the river channel itself would further aid in sediment control.
- If channelization is undertaken in the section through the urbanized portion of the city it most definitely should not be a concrete-lined channel. It should be as natural as possible with rip-rap on the channel sides and maybe with very large rocks scattered along the channel bottom. This will help slow the velocity of the river during periods of high flow and create pools and eddies for fish and aquatic life.
- The question of a desirable velocity and channel design should be carefully examined during final desgin with the involvement of the U.S. Corps of Engineers, the Nevada Bureau of Environmental Health, the Water Resources Division of the State of Nevada, the Nevada Department of Fish and Game and the project engineers. A too fast velocity will result in the channel being unsuited for aquatic life, while a slow velocity poses sedimentation and potential flooding problems.
- The Nevada Department of Fish and Game reports, "... We would recommend maintaining a minimum flow into the original channel. The reduction in river channel from 5,700 feet to 2,600 feet could cause some velocity problems detrimental to both the new channel and some distance downstream. Every effort should be made to prevent erosion problems."
- The possible channelization in the vicinity of the sewage treatment plant should be designed as an overflow channel to accept only above-normal river flows. The agencies named previously should be involved in the final design of this possible channelization.
- An off-channel lake, created by excavation for construction fill material, especially with a depth of 10 to 15 feet in parts, could be a valuable fisheries resource for a community which is generally poor in such resources. Deeper holes are better for fish life and result in less algae production. The round water conditions are such as to help ensure a fairly stable pool, and sedimentation should be minimal. Indications are that an off-channel lake might also be suitable for contact sports.

AMPHIBIANS, REPTILES AND MAMMALS

Amphibians, reptiles and mammals found in the project area are listed in Appendix 3C.

The bottomlands of the Humboldt River valley have some significance as mule deer range. Deer from adjoining winter ranges seek feed and shelter during late winter and early spring, but in small numbers. The activities normally associated with a growing community the size of Elko already preclude any abundance of these animals.

Other mammals which have been historically reported in the project vicinity, but seldom seen, include: racoon, badger, spotted skunk, coyote, bobcat, beaver, muskrat, marmot, black-tailed jack rabbit, cottontail rabbit and an assortment of small rodents.

There are no unique or endangered amphibians, reptiles or mammals within the project area.

Impacts

- There will be a permanent and also a temporary loss of terrestial wildlife habitat within the project area. While most habitat for reptiles and mammals would be restored within a few growing seasons there would be some permanent reduction of wetlands vegetation and larger old trees.
- During excavation and construction of the project there would be some temporary disruption of land and underwater surfaces and some destruction of terrestrial and aquatic biota. Within a few years after the project is complete there will be a natural re-establishment of most wildlife habitat and repopulation of displaced species.

BIRDS

Appendix 3C lists the various bird species which can be found from time to time within the project area. The area has a rich bird life including shore birds, waterfowl, birds of prey, a variety of scavengers and song birds.

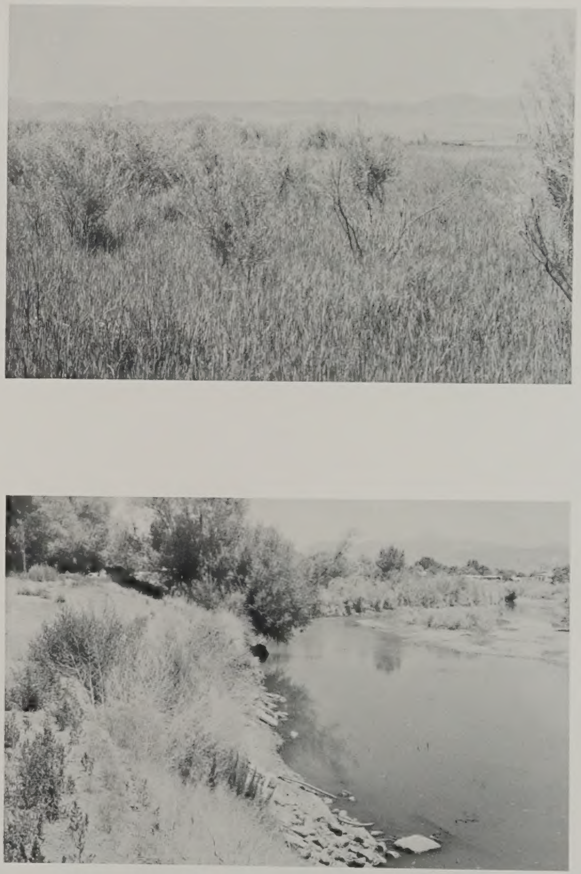
The ferruginous hawk is a species whose "rare and endangered" status is undetermined. They nest in meadows during spring and summer but not so close to Elko as to be within the project limits. Even less likely is there to be any adverse impact on two rare and endangered species -- the Prairie Falcon and the Greater Sandill Crane. Both can be found several miles east of Elko, the former on rocky bluffs and the latter in hay meadows, nesting along the river.

Snowy egrets have been cited in the Elko area and are reported to have large rookeries near the Hunter Ranch approximately 10 miles west of Elko and the Glazier Ranch approximately 15 miles east of Elko. The Nevada Department of Fish and Game reports no known rookeries in the immediate project area.* No egrets or egret nests have been observed on the site during the spring, summer, and fall months of 1974.

Of the other bird species known to be in the Elko region, at least seasonally, some of the more conspicuous include: great blue heron, Canada goose, mallard, American coot, killdeer, barn swallow, raven, robin, waxwing, starling, meadowlark, Bullock oriole, Brewer blackbird, western tanager, house finch, Oregon junco, and sparrows. Almost the entire above list is absent during winter, returning on migratory flights for breeding and nesting.

Impacts

- A temporary and permanent loss of terrestrial habitat within the project area may have a definite impact upon certain birds. While most habitat for birds would be resotred within a few growing seasons, some permanent reduction of wetlands vegetation and larger older trees may possibly disrupt the nesting sites of certain species.
- While excavation and construction of the project is taking place, there would be some temporary disruption of land surfaces and of terrestrial and aquatic biota. Within a few years after the project is complete, there will be a natural reestablishment of most bird habitat and repopulation of displaced species.



River Area Vegetation

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*Alan Flock and Leonard Hoskins, Nevada Department of Fish and Game, October 1974.

Part V

Impact: Human Environment

SECTION 19. HISTORY
20. ARCHEOLOGY
21. POPULATION AND LAND USE
22. VEHICULAR AND PEDESTRIAN TRAFFIC
23. SCHOOLS & EMERGENCY SERVICES
24. UTILITIES
25. VISUAL & AESTHETIC

Section 19

History *

Earliest photo of Elko, 1870
Nevada Historical Society, Reno

This synopsis of the historic values involved in the three proposed track relocation routes through the City of Elko -- Silver Street, North Bank, and South Bank -- briefly enumerates and considers the historic aspects of each of the routes. It evaluates the location of structures or sites along the original Central Pacific right-of-way -- the Southern Pacific's present alignment -- which played important roles in Elko's growth. Elko's link with the past, the original Central Pacific right-of-way, has particular historical significance in Elko's early growth in the 1860's and 1870's as well as the town's emergence into its present status as eastern Nevada's largest urban area.

The first growth occurred when Elko was a railroad construction camp. It held a strategic location when the Central Pacific opened in 1868. With the Nevada mining camps located to the northward and to the southward and the gold and silver camps located in southwest Idaho, Elko became the principal departure point for miners as well as the transfer point for their freight and supplies. The Central Pacific built large freight depot buildings to serve freighting operations.

There are presently no structures or sites in Elko listed on the National Register of Historic Places. Several of the more significant structures and sites within the project area are cited, however, with the belief that these historic locations do have significance to Elko and the State. At some future date one or more sites in the Elko area may be worthy of national designation and the measure of protection which such designation affords. It is unlikely, however, that any of the proposed alignments would threaten or adversely impact a structure or material remains of national or even state historic importance. (See Exhibit 19-1.)

THE PROPOSED SILVER STREET ALIGNMENT

There are no locations of historic sites or structures on Silver Street which would be encroached upon or destroyed by the proposed realignment route. Three historic structures located north of Silver Street would not be affected by acquisition of right-of-way and placement of tracks toward the south side of Silver Street. The alignment traverses an historic section of Elko. but remains of early-day activity have largely been destroyed by urban development or fire.

Central Pacific Warehouses

Two of the three original Central Pacific wooden warehouses dating from the 1860's lie immediately north of Silver Street, one near Twelfth Street and the other near Fourth Street. These warehouses originally were located between Railroad and Commercial Streets along the rail alignment presently used by Southern Pacific. The wooden buildings were moved to their present location shortly after the Western Pacific Railroad was completed. Both buildings appear well preserved and unaltered since original construction. The buildings' usage as warehouses along rail spurs would not be jeopard-

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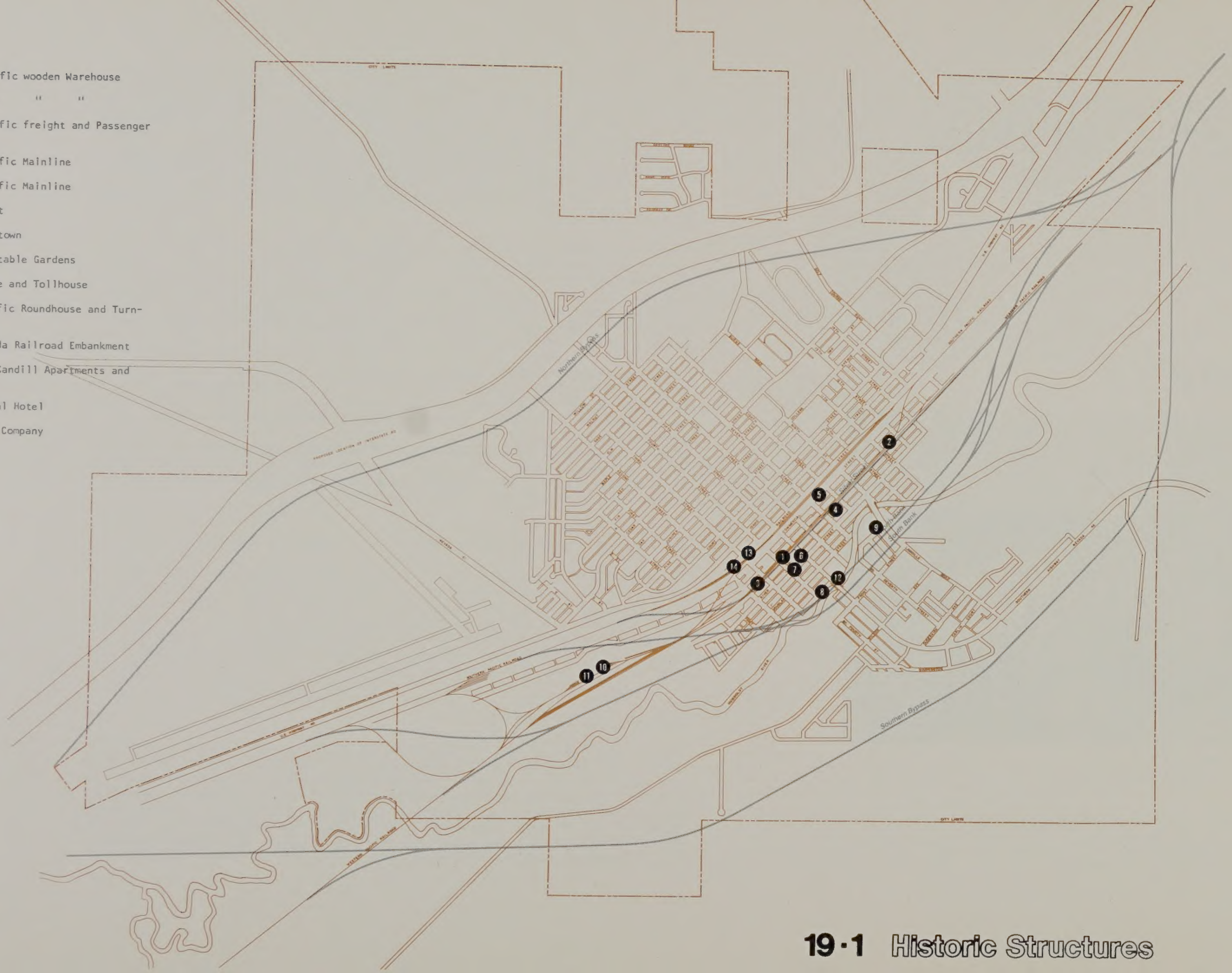
* Analysis of historic sites is based on a report prepared by Victor Goodwin, Appendix 5.

1. Central Pacific wooden Warehouse
2. " " " "
3. Western Pacific freight and Passenger Station
4. Western Pacific Mainline
5. Central Pacific Mainline
6. Missouri Flat
7. Elko's Chinatown
8. Chinese Vegetable Gardens
9. Lytton Bridge and Tollhouse
10. Western Pacific Roundhouse and Turntable
11. Eastern Nevada Railroad Embankment
12. "Doby Dock" Candill Apartments and Museum
13. The Commercial Hotel
14. Verdi Lumber Company



19·1 Historic Structures

ized by any of the railroad relocation alternatives. Overpasses or underpasses proposed as part of the Silver Street alternative would not require removal of either warehouse.

Western Pacific Depot

The Western Pacific Freight and Passenger Station, located at Third and Silver Streets, was erected late in 1908, at the time the advancing Western Pacific railhead reached Elko enroute from Salt Lake City to Oakland. The building has undergone some renovation since its construction, most significant effect of which has been the removal of the second story.

On August 22, 1910, the station was the site of a historic community celebration, marking the arrival in Elko of the first "through" passenger train on the Western Pacific, enroute from Salt Lake City to Oakland over the newly completed line. During the entire "steam" era, 1910-1949, the building was the passenger station for all the Western Pacific "varnish," including such "name" trains as The Exposition Flyer and The Royal Gorge.

Western Pacific Depot - 1910
(Northeastern Nevada Museum, Elko)

After the inception of paired-track service with the Southern Pacific, and continuing until that line abandoned passenger service in 1971, it also served as the Elko station for all the Southern Pacific passenger trains eastbound.

The historic consultant cited the Western Pacific mainline trackage itself as having historic significance, but much less than the Central Pacific (present Southern Pacific) main line through Elko.

Sites Without Material Remains

Silver Street was the focal point for many of the town's early-day activities. As such, it is felt that some consideration should be given to memorializing these bygone scenes and activities by the placement of appropriate markers or plaques along this alignment. No remains of these early-day activities are known to exist.

- Missouri Flat -- Southward from Commercial Street to the Humboldt River, and eastward from Fifth Street to Ninth Street were parked huge, high-wheeled "sagebrush clipper" freight wagons which rolled north and south to the satellite mining towns. Their Missouri mules, their horses or oxen, were corralled or tethered nearby. Here also the jerkline muleskinners and the bullwhackers, many of them hailing originally from Missouri, pitched their tents and bivouacked between trips to Hamilton, Treasure Hill, Eureka, the Cope District Mines, or the soutwest Idaho camps.

- Elko's Chinatown -- From Third and Silver to Fifth and Silver Streets. In the years following the completion of the Central Pacific Railroad in May 1869, and continuing well up into the Twentieth Century, this area was the heart of Elko's Chinatown. The tall flagpole which was so necessary an adjunct to any Nevada or western American Chinatown's observance of the Chinese New Year was located in a small plaza at Third and Silver Streets. The two joss houses in Elko's oriental district were both situated on Fifth Street, immediately south of its intersection with Silver. Stenovich Motors is now located on one of these joss house sites, and the Vogue Laundry, immediately west across Fifth Street, on the other.

PROPOSED NORTH BANK ALIGNMENT

The North Bank alternative encroaches upon the section of Elko formerly termed "Missouri Flat" (see discussion above). In addition, two other sites without material remains are traversed by the North Bank alignment:

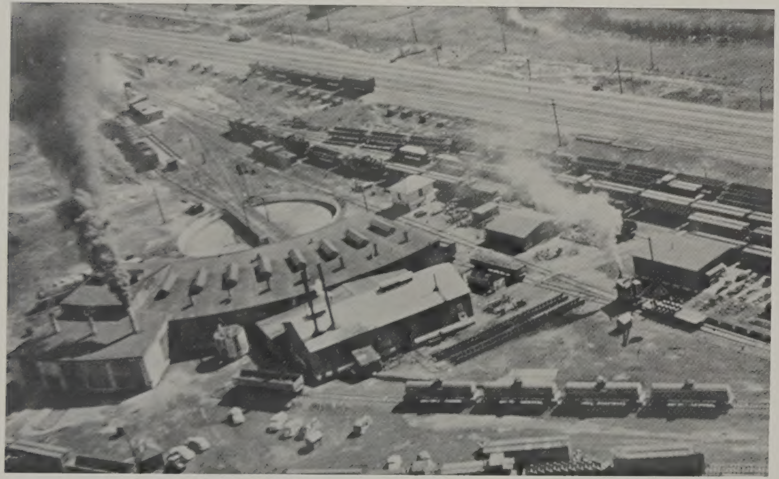
- Chinese Vegetable Gardens -- the gardens were located along the north bank of the Humboldt River, from Third Street east to Ninth Street and flanking Elko's Chinatown.

- Lytton Bridge and Tollhouse -- the present Ninth Street river crossing location has been used since 1869. Remains of the original wooden Lytton toll bridge and a successor bridge built in 1884 have both been removed. The bridge provided access to the mining country to the south.

Care should be exercised in excavation, since evidence of these sites may be unearthed during construction.

Three other sites affected by the North Bank alignment were located by the historical consultant. These sites appear to have less historic significance, but evidence remains at each site marking earlier events.

- Western Pacific's Roundhouse and Turntable -- the outlines of the roundhouse foundations and traces of trackage leading to the turntable are visible in the Western Pacific yards.
- Eastern Nevada Railroad Embankment -- a short section of 1873 graded fill for a never-completed rail line south to Eureka and mining areas.



Western Pacific Roundhouse - 1938
(Northeastern Nevada Museum)

- "Doby Doc" Caudill's Apartments and Museum -- railroad tie structures along Fifth Street, built by an early-day bootlegger who collected area historic treasures and exported them to Frontier Village in Las Vegas. (Community reaction to these structures is negative, both visually and historically.)

THE PROPOSED SOUTH BANK ALIGNMENT

This proposed alignment, which lies largely south of the present Humboldt River main channel, traverses several of the same sites crossed by the North Bank alignment:

- Lytton Bridge -- affected by an Eighth Street - Lamoille Road overpass.
- Western Pacific Roundhouse and Turntable.
- Eastern Nevada Railroad Embankment.

Impact

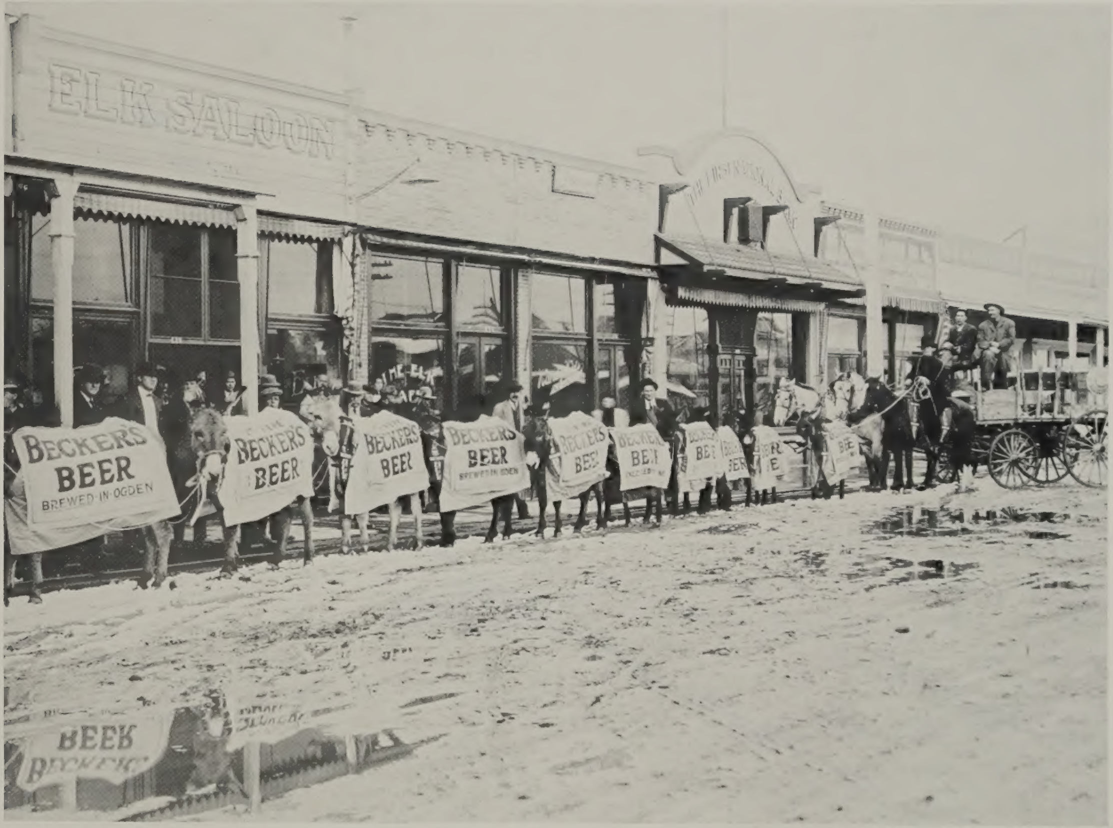
- Salvage operations would be considered appropriate for any of the above mentioned historic sites which are affected by an adopted track relocation plan.

ABANDONMENT OF THE PRESENT SOUTHERN PACIFIC ALIGNMENT

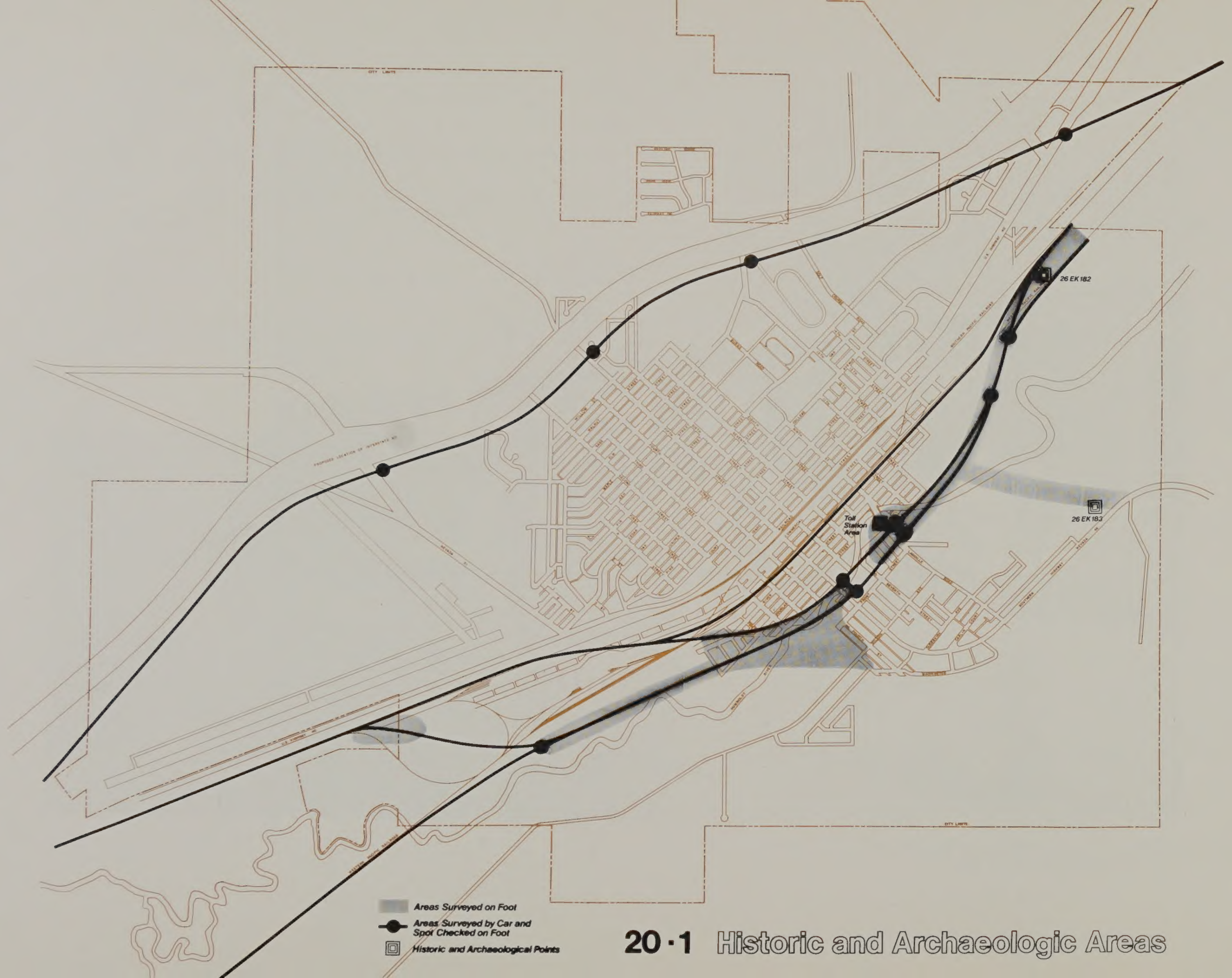
The present Southern Pacific trackage lies within the original Central Pacific right-of-way transferred to the railroad by land grant in the 1860's. And although the present physical facilities -- tracks, ties, switches, etc. -- are of no specific historic significance, the right-of-way has an historic association worthy of recognition. A lineal parkway scheme along the abandoned alignment, perhaps including a small exhibit of early-day railroad artifacts, would appear capable of enhancing the historic value of the Central Pacific alignment.

Several historic structures along the Southern Pacific alignment could be impacted by change brought about by abandonment of the present Southern Pacific alignment. These include:

- The Commercial Hotel -- The hotel, which pioneered big-name entertainment in casino operations during the 1930's, has been considerably expanded and remodeled since construction in the late 1800's.
- The Verdi Lumber Company -- The present Elko Farm Supply building housed Verdi operations which built many of the central and eastern Nevada mining camps.
- Central Pacific Freighthouse -- Located south of the alignment near Twelfth Street. (See Silver Street analysis.)



Commercial Street Downtown Elko - 1915
(Northeastern Nevada Museum)


CITY LIMITS
26 EK 182
Toll Station Area
26 EK 183
CITY LIMITS
Areas Surveyed on Foot
Areas Surveyed by Car and Spot Checked on Foot
Historic and Archaeological Points

20 · 1 Historic and Archaeologic Areas

Section 20

Archeology *

The archeological significance of sites affected by railroad relocation result from proximity to the Humboldt River. The westward-flowing river has probably served as a major transportation route across the northern Great Basin since earliest human penetration into the area. The river was reported to be the site for winter encampments for many of the Numic-speaking Indians who occupied the Great Basin for centuries before white contact. Fish and other resources from the river supported a relatively dense native population. Occupation was apparently intermittent from 2410 to 1370 B.C., according to radiocarbon dates from deposits in the South Fork Shelters, located just southwest of Elko. Projectile point types suggest that occupation was permanent after A.D. 1200. The mouth of the South Fork was preferred as a site for winter encampment and was named "Punodungahnivain," meaning "place where the house is," by the Numic people. However, small encampment sites could be found every mile or so along the river.

The Humboldt River Valley near Elko has been the scene of human activity for at least 4500 years, and probably much longer. At the time of Anglo-American entry, the area supported a denser population than most other areas of the Great Basin. Human activity became progressively more intense in the 1870's, following mining booms in the White Pine mining district in the south. Elko served as a major communication-transportation center serving mining districts to the south and as far north as Idaho. The flood plain and terraces of this river bear the scars of over a century of mechanized transportation, farming and urban construction. The traces of earlier occupation which can be expected to have survived are rare and more valuable as a source of knowledge about the area's prehistoric and early historic heritage.

FIELD RECONNAISSANCE METHODOLOGY

The reconnaissance team drove along all of the proposed alternate project alignments to identify areas where the earth surface had been least subjected to post-1900 modification by excavation, construction or land fill activities. Then the team walked throughout the identified areas to look for surface indications of prehistoric and early (pre-1900) historic remains. (See Exhibit 20-1.) Excavation, road and stream cut profiles were inspected for indications of subsurface remains. An area identified by the project's historical consultant as the site of a pre-1900 toll station was carefully inspected. Silver Street, also identified as the site of early historic activity, was inspected both on foot and from a car.

Two sites of prehistoric activity were subjected to preliminary site examinations. Test pits 0.5 X 1.0 m were excavated to a depth of 60 cm and fill was screened through mesh rocker screens. Specimens found in the test excavations were catalogued and are stored at the Nevada Archeology Survey.

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*Analysis of archeological resources is based on a report on "Archaeological Reconnaissance for the Elko Nevada Railroad Relocation Demonstration Project and Statement of Environmental Impact of the Relocation Project on Archeological Resources with Recommendations," prepared by Mary Rusco, Consulting Archaeologist, Nevada Archaeological Society, University of Nevada, Reno (See Appendix 6).

SITE INVENTORY

Two areas were identified as historic sites by the project historian. These were inspected specifically to seek archeological remains of historical significance.

Toll Station

This site, located on the right bank of the river at Ninth Street, has apparently been subject to a great deal of relatively recent modification. Remains of a 20th Century structure were found and some debris of an earlier date were noted. It would appear that most, if not all, traces of the historic structure have already been obliterated.

Silver Street

Post-1900 construction, including paving, has obscured most traces of the early occupation of Silver Street. No subsurface tests were made in this area which is now intensively occupied. Excavations would more than likely expose historic midden and structures.

Two prehistoric sites were recorded: one located between existing tracks of the Southern Pacific and Western Pacific railroads on the east edge of the City (26 EK 182), and one located on bluffs overlooking the Humboldt along the proposed Twelfth Street extension (26 EK 183). (See Exhibit 20-1.)

Site Between Existing Tracks (EK 182)

This site is associated with an old flood plain of the river. Archeological manifestations on the surface are concentrations of flake stone artifacts. The test pit was excavated near one of these concentrations in an area where the back dirt from large animal burrows was observed to contain flakes.

Artifacts observed on the surface were prodominantly debris from the manufacture of flake tools made from a white cryptocrystalline silicate known to be quarried north of Battle Mountain. Fragments of various artifacts, probably cutting or scraping tools, were observed. No projectile points or other types of artifacts, which can be clearly assigned a relative date, were observed.

During the test excavation a total of 20 flakes, eight charred bone fragments (unidentified, but probably from small rodent species), small pieces of charcoal, and burned earth were recovered at various depths down to 45 cm.

Along Proposed Twelfth Street Extension (EK 183)

This site is located on a bluff above the left bank of the river, probably an old dissected terrace. Artifacts observed were similar to those at the other prehistoric site. No concentrations were noted and the test excavation revealed no archeological remains below the loose surface.

Because of the absence of artifacts which can be dated, particularly projectile points, it is impossible to estimate time depth for either site. It is likely that a complete systematic collection from the surface plus excavation of a significant portion of the site between the tracks would yield the necessary data, to place these sites in time.

On the basis of the preliminary site examination, it can be inferred that both sites were the locus of a variety of activities including the manufacture and/or retouching of flake tools, and the processing of various raw materials, including food, by scraping and cutting.

MITIGATION

The Ninth Street location of the toll station is not judged to have significant archeological remains on the basis of the preliminary site examination. Construction in that area will proceed with due caution.

The Silver Street alternative crosses an area of historic significance. No subsurface test excavations were made in this now congested area. Construction will be preceded by a systematic search for significant historic remains, if this alternative alignment is selected.

The prehistoric sites will be avoided if possible. Consideration of these sites in the final design will determine if salvage is necessary prior to construction.

Section 21

Community and Land Use

IMPACTS TO POPULATION

- During the construction period the project should have a minor beneficial effect in stemming what appears to be an out-migration of young male workers. Construction will result in providing an average of 100 new jobs, including support crews, over a three year time span.

- All of the project alternatives will result in displacement of some Elko residents from their present homes, with the Silver Street alternative resulting in the least displacement of people. Either the North or South Bank Alternatives will involve displacement of from 80 to 115 more people than the Silver Street Alternative. Table 21-1 lists the number of people estimated to be displaced by each alternative.

- A Twelfth Street Underpass, versus an Eighth Street Overpass, will result in less displacement of people. For the Silver Street and South Bank Alternatives the difference is slight; approximately ten people. For the North Bank Alternative the difference is estimated to exceed 30 people.

Silver Street Alternative

- Estimates indicate that up to almost 160 people, composed of 85 families and single individuals, may require relocation assistance. The individuals and families concerned generally fall into the lower middle to low income levels.

- County and State Welfare agencies estimate that there are approximately ten individuals or families involved who are presently receiving either Supplemental Security Income (old age benefits), Aid to Dependent Children, or other assistance.

- A high proportion of the people who would be impacted are tenants. An estimated 70 percent of the people who would be affected fall into this category.

- Families are not generally large, which means there should be no serious problem in finding housing for such families. However, there are an estimated 20 to 28 individuals affected who live in rooming or boarding houses. This could present a relocation problem, since there are few rooming houses in Elko for which rent is within the financial range of the income level of these people. It is possible that some of the individuals presently living in such accommodations could be relocated to alternative housing.

Northbank Alternative

- Analysis of the required right-of-way indicates that approximately 115 individuals and families (with total estimated population of 264 people) would require relocation with construction of the Eighth Street crossing, or 101 individuals and families (with total estimated population of 232 people), if the Twelfth Street Alternative is selected. The families and individuals affected are generally in a lower middle to low income category.

- County and State Welfare agencies estimate that there are ten to 15 individuals and families along this alignment who are now recipients of Supplemental Security Income, Aid to Dependent Children, or other welfare benefits.
- A large proportion, approximately 85 percent, of the affected population are tenants in rental houses and trailers. There are about 25 residences which are rental units where "like-housing" would not meet with safe, decent and sanitary guidelines. In this case, other forms of housing which meet satisfactory standards, such as factory built or mobile homes, may be acceptable for relocation housing.
- Families along this corridor are of average size, presenting no significant replacement housing problems for large families.

Table 21-1

ESTIMATED POPULATION DISPLACED

Alternative	Estimated Number of People Displaced
Silver Street with Eighth Street Overpass	159
Silver Street with Twelfth Street Underpass	149
North Bank with Eighth Street Overpass	264
North Bank with Twelfth Street Underpass	232
South Bank with Eighth Street Overpass	235
South Bank with Twelfth Street Underpass	225

Note: Based on the assumptions of 2.3 persons per single family home or mobile home, and one person per room in rooming and boarding houses.

South Bank Alternative

- Selection of the south bank alignment with either the Eighth Street or Twelfth Street crossings would displace approximately the same number of individuals and families. Approximately 102 individuals or families (with an estimated population of 235 people) would be affected with an Eighth Street crossing and 98 individuals or families, representing an estimated population of 225, would be affected by a Twelfth Street crossing. The families and individuals are generally lower middle to low income level.
- County and State Welfare agencies indicate that approximately ten to 15 individuals or families within the corridor are currently receiving some form of Welfare assistance.
- Approximately 86 percent of the affected population are tenants, mainly of mobile homes or trailers. Relocation of such households, compared with occupants of single family homes, should be somewhat easier in the Elko area, due to the greater availability of mobile home spaces over conventional housing rental units in the City.

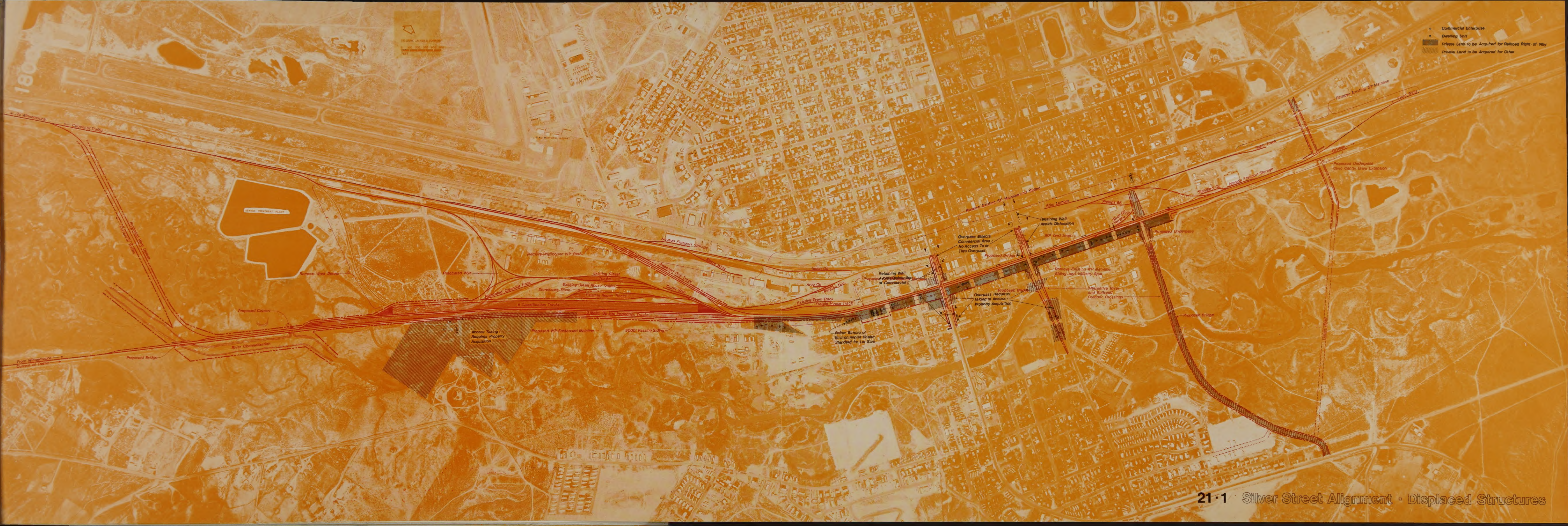
IMPACTS TO LAND USE

Among the impacts of the various alternative relocation plans is the displacement impact each will have. This displacement is obviously of major concern to local residents. Exhibits 21-1 through 21-3 show the parcels and structures which would be displaced by each of the alternatives. Table 21-2 summarizes the number of homes and businesses displaced by each alternative, and Table 21-3 shows the estimated relocation cost. The subject of displacement is discussed in greater detail below.

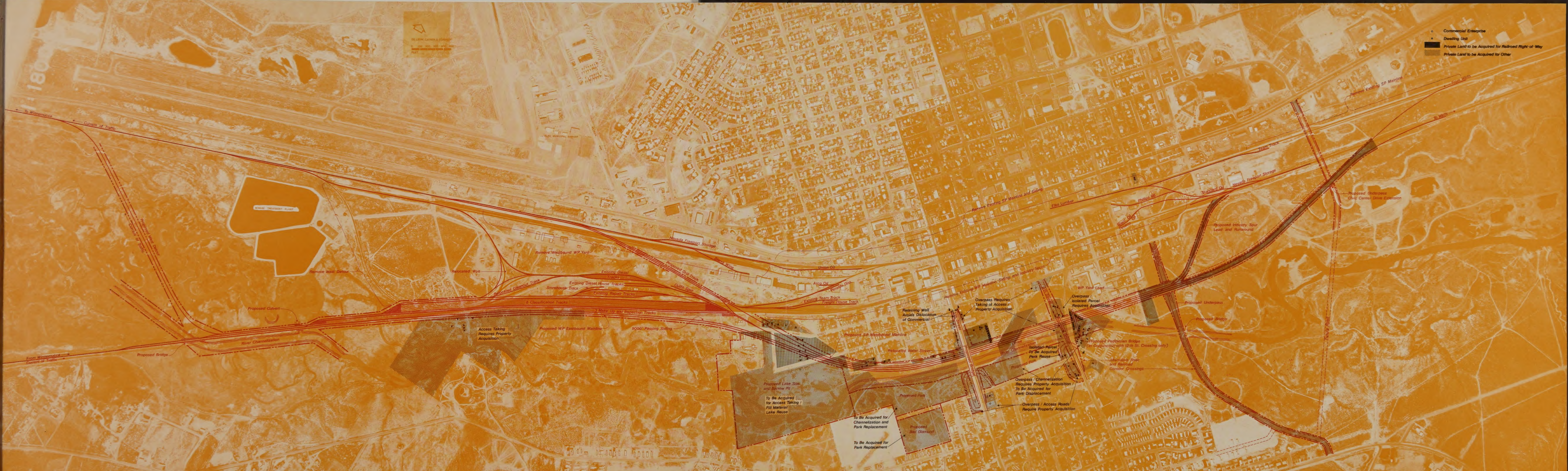
Other significant impacts on land use include disruption of existing neighborhoods; reduced accessibility which, for commercial properties particularly, can mean a loss of trade and a decline in assessed valuations; increased noise impact on some properties and adverse aesthetic impacts from structures and passing trains.

Silver Street Consolidation

- The Silver Street alternative would result in displacement of all existing properties on the south side of Silver Street between Second and Twelfth Streets for a depth of half a block. After construction of the project, a vacant strip, approximately 100' in depth, would be left south of the consolidated tracks. This strip is most likely to remain vacant, as its potential for future use is extremely limited. The presence of the nearby tracks makes the area unsuitable for commercial or residential use. Light industrial use is the most reasonable future use, but the shape of the parcels would probably make it diffi-

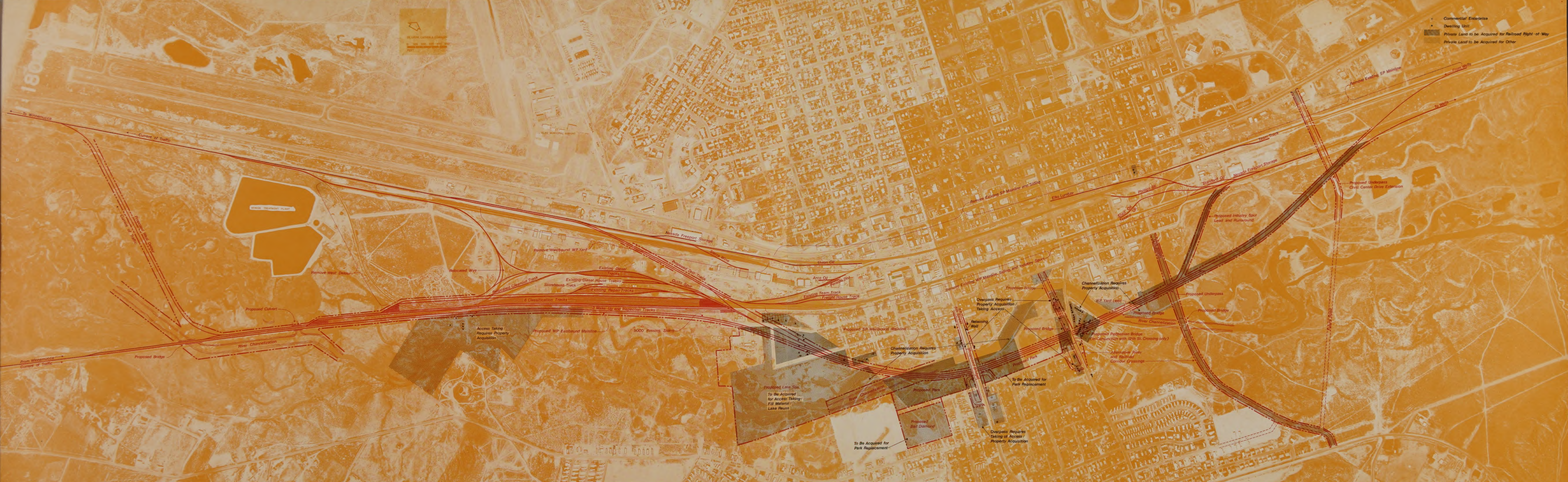


21·1 Silver Street Alignment - Displaced Structures



DE LEUW, CATHER & COMPANY
0 100 200 300 400 500
FEET
Commercial Enterprise
Dwelling Unit
Private Land to be Acquired for Railroad Right-of-Way
Private Land to be Acquired for Other
To Winnemucca
Current of Traffic
Proposed West Detour
Current of Traffic
SEWAGE TREATMENT PLANT
Remove West Detour
Proposed Culvert
River Channelization
Proposed Bridge
From Winnemucca
Current of Traffic
Relocated Wye
Remove Westbound WP Yard
Nevada Freeport Storage
Sierra Wine
Proposed Drill Track
Existing Diesel Tracks
Existing Diesel House Tracks
Storehouse Track
Relocated Cleanout Track
Outfit Spur
Existing Repair Tracks
8 Classification Tracks
3 Make Up and Inspection Tracks
Proposed WP Eastbound Mainline
9000' Passing Siding
Access Taking Requires Property Acquisition
Union Oil
Arco Oil
Peraldo Dist.
Existing Team Track
Freight House Track
Remove Existing WP Mainline, Siding, and Industry Spurs
Retaining Wall Avoids Dislocation of Commercial
Overpass Requires Taking of Access / Property Acquisition
Proposed SP Westbound Mainline
Relocated Water Street
5th Street
Proposed Bridge
Levee
River Channelization
Proposed Lake Site and Borrow Pit
To Be Acquired for Access Taking / Fill Material Lake Reuse
Proposed Park
To Be Acquired for Channelization and Park Replacement
Proposed Ball Diamond
To Be Acquired for Park Replacement
Isolated Parcel To Be Acquired Park Reuse
Proposed Park
Overpass / Channelization Requires Property Acquisition / To Be Acquired for Park Displacement
Overpass / Access Roads Require Property Acquisition
WP Yard Lead
Overpass / Isolated Parcel Requires Acquisition
Proposed Pedestrian Bridge (In Conjunction with 12th St. Crossing only)
Alternative River and Railroad Corridor Crossings
Proposed Underpass
Proposed Bridge
Remove Existing SP Mainline and Siding
Elko Lumber
Phillips 66
Shell Oil
Texaco Oil
Standard Oil
Nevada Freeport Storage
Team Track
Proposed Industry Spur Lead and Runaround
Proposed Underpass Civic Center Drive Extension
Future Road
Remove Existing SP Mainline
From Wells
To Wells

21·2 North Bank Alignment - Displaced Structures


Commercial Enterprise
Dwelling Unit
Private Land to be Acquired for Railroad Right-of-Way
Private Land to be Acquired for Other
To Winnemucca
Current of Traffic
Elko Municipal Airport
Sewage Treatment Plant
Proposed West Detour
Current of Traffic
Remove West Detour
Relocated Wye
Remove Westbound WP Yard
Nevada Freeport Storage
Sierra Wine
Proposed Drill Track
Existing Diesel Tracks
Existing Diesel House Tracks
Storehouse Track
Existing Repair Tracks
Outfit Spur
Relocated Cleanout Track
8 Classification Tracks
3 Make-Up and Inspection Tracks
Proposed Culvert
River Channelization
Proposed Bridge
From Winnemucca
Current of Traffic
Access Taking / Requires Property Acquisition
Proposed WP Eastbound Mainline
9000' Passing Siding
Union Oil
Arco Oil
Peraldo Dist.
Existing Team Track
Freight House Track
Remove Existing WP Mainline, Siding, and Industry Spurs
Proposed SP Westbound Mainline
Channelization Requires Property Acquisition
Proposed Lake Site
To Be Acquired for Access Taking / Fill Material / Lake Reuse
River Channelization
Proposed Park
Proposed Ball Diamond
To Be Acquired for Park Replacement
6th Street
Retaining Wall
Overpass Requires Property Acquisition / Taking Access
Proposed Bridge
Proposed Park
To Be Acquired for Park Replacement
Overpass Requires Taking of Access / Property Acquisition
Proposed Bridge
Channelization Requires Property Acquisition
WP Yard Lead
Proposed Bridge
River Channelization
Proposed Pedestrian Bridge (In Conjunction with 12th St. Crossing only)
Alternative River and Railroad Corridor Crossings
Proposed Underpass
Proposed Bridge
Remove Existing SP Mainline and Siding
Elko Lumber
Phillips 66
Shell Oil
Texaco Oil
Standard Oil
Nevada Freeport Storage
Team Track
Proposed Industry Spur Lead and Runaround
Proposed Underpass Civic Center Drive Extension
Remove Existing SP Mainline
From Wells
To Wells

21·3 South Bank Alignment · Displaced Structures

cult to market the land.

- Depending on whether an Eighth Street Overpass or a Twelfth Street Underpass was built, 57 homes and 28 rooms, or 56 homes and 20 rooms, would be displaced. The Silver Street alternative would have the least displacement impact on residences but the most severe impact on commercial establishments.
- Combining the Southern Pacific and Western Pacific tracks along Silver Street, which is the present WP alignment, also necessitates relocation of up to twenty-four businesses to provide an adequate width of right-of-way for the railroads.
- Many of the businesses are significant to the community for recreation and services. Their loss would have a definite effect on the downtown business district.
- The Star Hotel and Nevada Dinner House are well-known Basque dining establishments, attracting many patrons with their food and atmosphere. Above the dining areas, both have rooms for rent.
- Cloud 9 is a cocktail lounge across from the Western Pacific Depot.
- Telescope Lanes is one of the two bowling alleys in Elko, with a cocktail lounge, billiard parlor and rooms for rent on the second floor.
- Vogue Cleaners provides laundry and dry cleaning service to the Elko area. This business is important in that there are only three cleaners within the City.
- Stenovich Motors serves Elko as Jeep, Imperial, Chrysler, Plymouth and International sales and service, as well as having an auto body shop located in the building. Relocation of the owner's Chevron Service Station would also be necessary.
- Smaller businesses in the area include the West Hotel, Paloma Barber Shop, Riger's Paints, Mikes' Small Engine Shop, another small bar, and five warehouses.
- Gateway Mobile Homes Sales, located at Eighth Street and Douglas Street, would be relocated to make space available for the Eighth Street crossing of the Humboldt River. This establishment presently operates from a "split-lot", with some of their homes at Fifth Street and Douglas Street.
- The Fifth Street crossing would require relocation of Lesbo Trailer Sales; Eddie's Market, a small neighborhood market; and Sage Bar. The Twelfth Street crossing would require relocation of two Nevada Power Company transmission and distribution parcels.
- Interviews with employers, and estimates by the Nevada Employment Security Department, indicate that approximately 75-110 employees would be affected by the Silver Street alternative.
- The overpass structures at Fifth and Eighth Streets would constitute physical and aesthetic barriers and would essentially divide the central area between Railroad and Commercial Streets effectively into three parts -- from Third to Fifth Street, from Fifth to Eighth Streets, and from Eighth to Eleventh Streets. This impact could be reduced, but possibly not entirely eliminated, by underpasses.
- The Silver Street alignment, particularly with overpasses at Fifth and Eighth Streets, will do little to stimulate the redevelopment of the Elko Central Business District. In fact, in the opinion of some local realtors, the access restrictions posed by the overpasses would likely result in a shift of existing businesses either to the north or to the east, and this would cause an undesirable sharp decrease in land values in the Central Business District.
- An underpass at Twelfth Street, versus an overpass at Eighth Street, would involve less disruption of existing property and less severe adverse effects on the commercial potential of the central plaza. Nevertheless the Fifth Street Overpass would still effectively bisect the central plaza and tend to isolate the area on Commercial and Railroad Streets between Third and Fifth Streets.
- On Silver Street the properties which remain, either backing onto or fronting onto Silver Street, would be subjected to a variety of impacts (including noise -- from sources other than the train horns -- vibration, and visual impacts) which would reduce their desirability for certain existing uses, particularly residential and commercial use. The Silver Street alternative would sever an existing residential neighborhood and the above outlined impacts would effectively add insult to existing injury to this neighborhood.
- The major beneficial impacts with the Silver Street alternative are that it does not affect the Southside park; it would not affect existing residences along the river; it allows more potential for eventual open space use of existing riverfront land; and it does not isolate certain businesses such as the Sharp Concrete Co. plant.

The North Bank Alternative

- The North Bank alternative with either an Eighth Street Overpass or a Twelfth Street Underpass would have the most severe impact on displacement of residences, 115 or 101 and a similar impact as the South Bank alternative on the number of commercial establishments displaced.
- Moving the railroad tracks away from the Central Business District dis-

places fewer businesses but does not totally eliminate significant impact to the business community. Fourteen businesses are affected by the relocation of the tracks to the north bank of the Humboldt River, with a crossing at Eighth Street and thirteen with a Twelfth Street crossing.

- Sharp Concrete Co. is one of two ready-mix concrete producers in Elko. Reconstruction of the Western Pacific yards would necessitate relocating this plant. Currently the primary gravel source for the Sharp operation is located on the east side of town, near the river. The owner has indicated that it would be necessary to relocate to the area near the gravel source.

- The Depot Market, a neighborhood market on Fifth Street next to the river, would be removed by the north bank alignment. Because of its status as a neighborhood grocery store, relocation would be difficult to ensure successful continuation of the business. The owner is aware of this and has indicated the possibility that he would sell out his store and retire.

- The North Bank Alignment encroaches on the City Yards, but the principal shop buildings can be avoided by the railroad right-of-way.

- The Fifth Street crossing may also require relocation of the Husky Oil Station, at Fifth and Front Streets, along with Chester Plumbing, Jeff's Cycle Shop, a boat shop and P-M Warehouse in order to provide access to the crossing from Front Street.

- Interviews with employers, and estimates by the Nevada Employment Security Department, indicate that approximately 30-35 employees would be

Table 21-2

NUMBER OF HOMES AND BUSINESSES DISPLACED BY EACH ALTERNATIVE

ALTERNATIVE	NO. OF SINGLE FAMILY HOMES & MOBILE HOMES* Owner-Occupants	Tenants	NO. OF BUSINESSES
Silver St. with 8th St. Overpass	25	32	24
Silver St. with 12th St. Underpass	22	34	23
North Bank with 8th St. Overpass	17	98	14
North Bank with 12th St. Underpass	15	86	13
South Bank with 8th St. Overpass	14	88	14
South Bank with 12th St. Underpass	14	84	13

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*Note: The above table does not include "rooming houses". With the Silver Street alternative an estimated 28 residents of rooming houses would be affected in the case of the Silver alternative with an Eighth Street Overpass and 20 such residents with a Twelfth Street Underpass.

Table 21-3

ESTIMATED RELOCATION ASSISTANCE COST OF EACH ALTERNATIVE

Alternative	Estimated Cost
Silver Street with 8th Street Overpass	$822,300
Silver Street with 12th Street Underpass	$740,100
North Bank with 8th Street Overpass	$715,100
North Bank with 12th Street Underpass	$631,300
South Bank with 8th Street Overpass	$630,900
South Bank with 12th Street Underpass	$612,600

affected by this alignment.

- A very significant major benefit of both the North Bank and South Bank Alternatives is that it releases the central area between Railroad and Commercial Streets to become a meaningful focus for downtown Elko. Alternative redevelopment schemes for this area are discussed in Section 11. This achieves one of the major objectives of the project. Furthermore, it is doubtful if without release of this central area for re-use the project would be economically justified. The benefits to be obtained by the enhanced prospects for existing commercial properties, possible limited redevelopment of the area, and resultant increases in assessed valuations, in large measure help justify the project.

- Similarly, with both the North and South Bank Alternatives, Silver Street could be paved and made into a collector street, as proposed in the Elko Plan. There would be increased commercial and industrial potential for the area between the Central Business District and the river, also with a likely accompanying increase in assessed valuations. As discussed previously this area presently has intermixed land uses with a substantial number of substandard homes.

- Placing the tracks along the north bank of the river will adversely impact residences directly to the north due to noise, vibration and visual impacts. However, it is debatable whether from the long range point of view most of this area is suitable for residential development, and the Elko comprehensive plan in fact designates the majority of it for future industrial use.

- Two mobile home sales lots are affected by this alignment. Gateway, described in the Silver Street discussion, would be removed to provide for the Eighth Street crossing. Okay Trailer Sales is located at the corner of Fifth Street and Front Street. This area would have access onto Fifth Street cut off by an overpass structure, and the area has been designated as parkland after the railroad relocations.

- Zillich Wrecking Yard, also at Fifth and Front Streets, would be relocated for the same reasons as Okay Trailer Sales. Removal of the wrecking yard from the southern river bank is one of the additional enhancements brought to the area by selection of an alignment along the river corridor.

- Warehousing and storage areas affected by this alignment include a Nevada Power Company warehouse, BLM storage yards and two other warehouses.

- Among the other adverse impacts of both the North and South Bank Alternatives, with river channelization, are that they adversely affect the existing Southside park and the potential for riverfront development. Some alternative plans for riverfront treatment are discussed in Section 11. With the tracks located north of the river there would be a greater potential for open space use along the river than with the South Bank Alternative. Furthermore, in the case of the North Bank alternative, without river channelization and with a Twelfth Street Underpass, it would be possible to avoid most of the existing Southside Park.

The South Bank Alternative

- The South Bank Alternative would have slightly less displacement impact on residences than the North Bank Alternative. It would involve displacing 102 or 98 residences, depending on where the second railroad crossing was built.

- Relocating the railroads to the south bank of the river affects up to fourteen businesses. This alignment has about the same effect as the North Bank Alignment on the BLM Storage yards, Sharp Concrete, Zillich Wrecking Yard, Depot Market, Gateway Mobile Home Sales, Okay Trailer Sales, the City Shops and the Nevada Power Company storage building.

- Husky Oil Gas Station, located at Fifth and Front Streets, would have direct access to Fifth Street cut off due to the necessary approach distance for the railroad crossing. Cutting off access to the station would necessitate its relocation.

  Relocation of Jeff's Cycle shop, a boat shop, Monson's Wheel Shop, P-M Warehouse, Roadside Market and Mountain City Lumber Company would be required to provide for the Fifth Street crossing. These additional business relocations would be necessary in order to avoid a steep grade on the overpass structures which would create a hazard for traffic during winter storms.

- Interviews with employers, and Nevada Employment Security Department estimates, indicate that approximately 30 to 35 employees would be impacted in some way by this alignment.
- The benefits which would accrue to the Elko Central Business District and the area between the Central Business District and the river would be almost the same under the South Bank Alternative as the north bank route; except that, while placing the railroad on the south bank further removes it from the Central Business District. It also eliminates any possibility of future spur usage for the proposed industrial area north of the river.
- Placing the tracks south of the river will adversely affect residences immediately south of the tracks due to noise, vibration and visual impacts. This area is indicated in the Elko long range plan as a residential area. Placing the tracks on the south side would be an adverse impact on the existing residential neighborhood.
- The South Bank Alternative would also eliminate much of the existing Southside park and would significantly reduce the potential for riverfront park development. It places the tracks between the river and existing residential development between Fourth and Ninth Streets, although the railroad itself would be removed from most residential development by one half to one block.

MITIGATION

- Homes and businesses which are displaced as a result of the Elko railroad track consolidation and relocation project are eligible for federal relocation assistance. The assistance which would be available to such displaced persons and businesses is outlined in Appendix 9.
- Discussions with local savings and loan institutions, as well as the Farmers Home Administration, indicate that funds are available for new-start housing loans. In addition, there are several low cost HUD235 houses vacant along Southside Drive.
- If, as the project moves towards the design phase, information indicates that a sufficient supply of comparable replacement housing may not be available for all the residents on the approved location, a preliminary study may be necessary to determine whether or not a last resort housing plan is necessary. Such a plan would then determine how, when, and where housing would be provided, environmental suitability, construction, financial details, and plan feasibility. This last resort housing could be easily adapted to accommodate tenants as well as owner-occupants.
- Both the North Bank and South Bank Alternatives would adversely impact the existing Southside park. This problem is discussed in full in an accompanying "4f" Statement, and various park replacement and riverfront development plans are presented in Section 11.
- If redevelopment and rejuvenation of the Central Business District of Elko are to be achieved as a definite goal of the project, the Silver Street alternative with overpasses should not be given serious consideration. Only if underpasses are feasible, and are not seriously disruptive of the central area between Railroad and Commercial Streets, will the plan not result in such a major adverse impact that it should receive further consideration. Alternative redevelopment plans for the central area vacated by the tracks are presented in Section 11.
- If the North Bank Alignment should be determined to be the desirable alternative, the City should pursue the recommendation of its long range plan to encourage conversion of much of the area north of the tracks ultimately to industrial use, which would be most compatible with the adjacent railroads.
- Recommendations for mitigation of adverse visual, noise, and vibration impacts on adjacent land uses are contained in the respective Sections elsewhere in this report.
- Local realtors indicate an average availability of 8 to 12 houses each, with a total availability at any time of 45-65 units. These available units vary in price from about $14,000 to $80,000.
- Daily newspapers have a few additional ads for units for sale by owners. Advertisements in the local paper for rentals average from 8 to 17 units available, with a few additional rentals also available through realtors.
- Vacancies for various sizes of mobile homes average 40-50 spaces within the City. Mobile home lots for sale within the City, as well as surrounding subdivisions such as Pleasant Valley, Spring Creek and Meadow Valley Ranchos, add to the potential relocation assistance that can be offered.

Section 22

Vehicular and Pedestrian Traffic

INTRODUCTION

This section describes the vehicular and pedestrian transportation impacts of the railroad relocation alternatives. Principal transportation impacts relate to north-south vehicular movement across the river and railroad tracks. Following a general overview of existing and projected traffic conditions in Elko, four areas of impact are addressed:

- Existing and projected rail crossing delay and accident avoidance.
- Projected year 2003 traffic volumes which could be expected from alternate rail/river crossing locations.
- CBD circulation and parking problems attributable to present railroad severence of the downtown.
- Compatibility of the railroad relocation alternatives with the transportation element of the City General Plan.

EXISTING & PROJECTED TRAFFIC VOLUMES

Exhibit 22-1 provides an overview of 1973 average daily traffic volumes on major streets within and surrounding the City of Elko. The average annual percentage increase since 1966 is also shown. With the exception of U.S. Highway 40 (Idaho Street) and State Route 46 (Fifth Street) traffic volumes on all streets are presently under 5,000 vehicles per day.

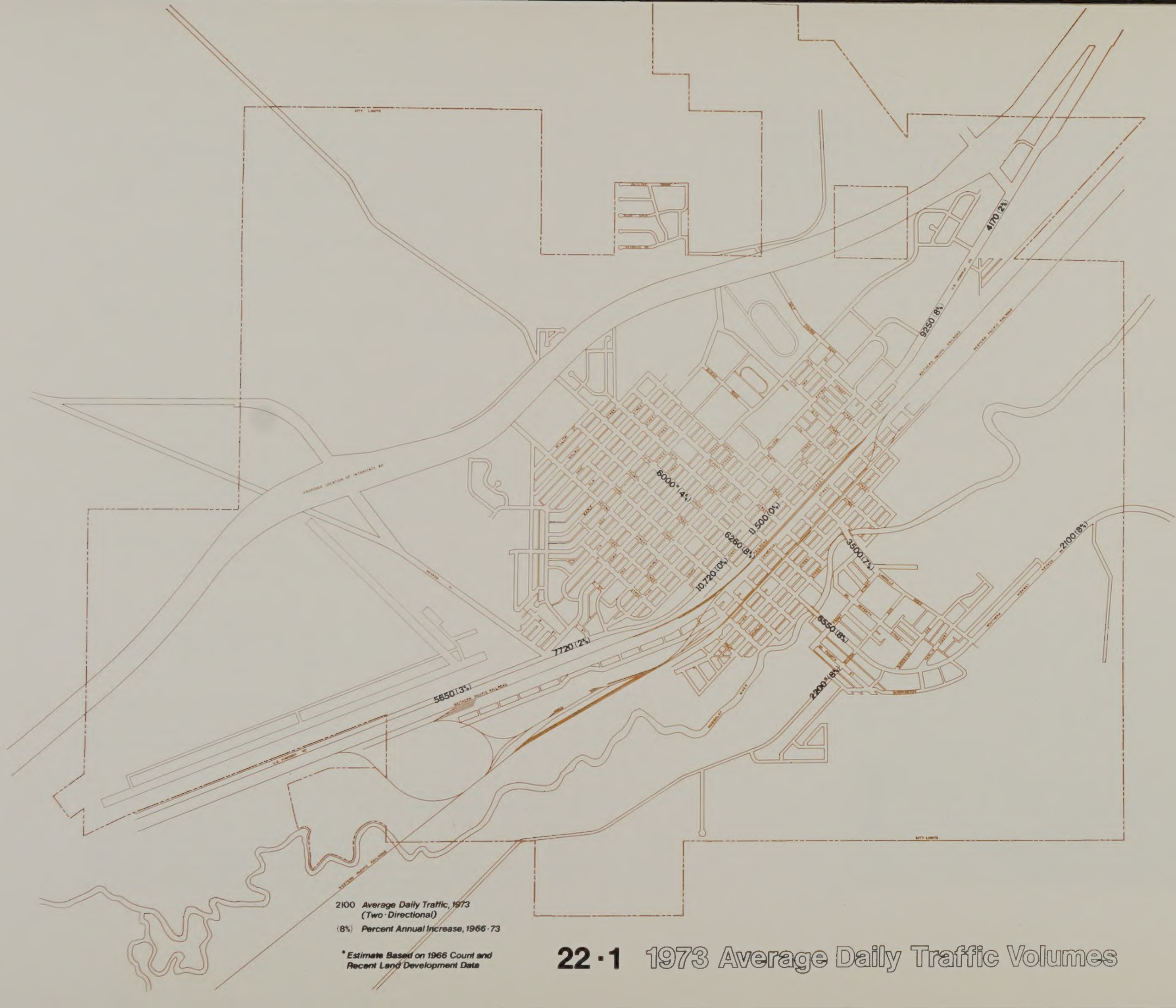
Table 22-1 provides a 13-year history of traffic volumes for two locations on Fifth Street. Approximately one-third of the traffic crossing the tracks and two-thirds of the traffic crossing the river uses Fifth Street.

No traffic projections have been developed previously for the City. However, review of the 2.75 percent average annual population growth rate to the year 2003 and the accompanying traffic volume, which increases at about 30 percent faster than the population, indicates most arterial traffic volumes can be expected to double between 1973 and the year 2003.

Volumes of over 10,000 Average Daily Traffic (ADT) with traffic signaling typically warrant four lane treatment. By the year 2003, only Fifth Street, between Cedar Street and Wilson Avenue, and Idaho Street would require four laning based on this standard. The remaining streets should adequately carry traffic with two moving lanes.

RAIL CROSSING DELAY AND ACCIDENT AVOIDANCE

Over 40,000 vehicle crossings per day were observed at 17 at-grade railroad crossings in 1973, a figure expected to double to over 80,000 vehicle crossings per day in 2003. (See Exhibit 22-2.) Meanwhile the probability of blockage due to train passage or switching is increasing as rail tonnage and



2100 *Average Daily Traffic, 1973 (Two-Directional)*

(8%) *Percent Annual Increase, 1966-73*

* *Estimate Based on 1966 Count and Recent Land Development Data*

22·1 1973 Average Daily Traffic Volumes length of trains increase.

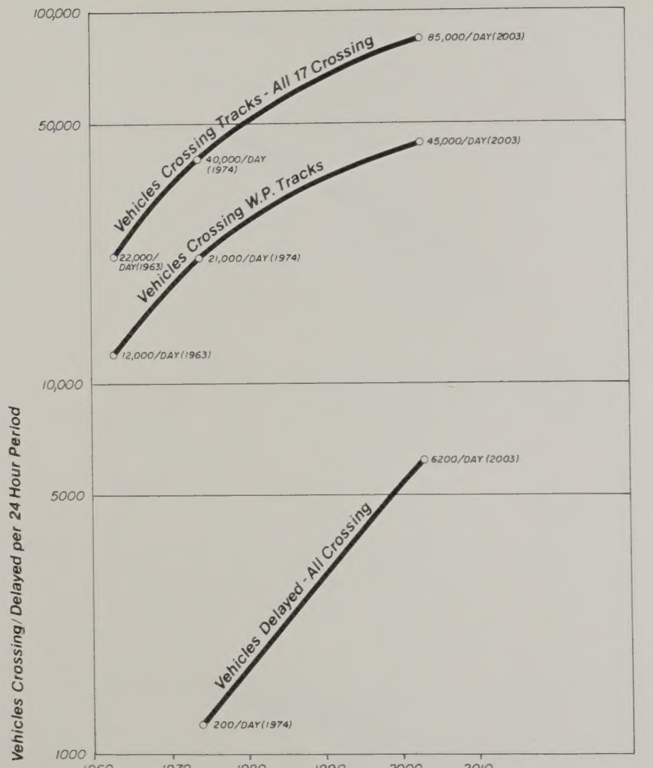
Traffic stoppage of two hours and 2.5 minutes per day in 1974 per 24 hour period, is expected to reach two hours and 50 minutes per day in 2003. Increasing traffic volumes will compound blockage of crossings to cause total traffic delay to grow from 2,600 vehicle minutes per day in 1974 to 5,600 vehicle minutes per day for 2003, a 115 percent increase in travel delay. (See Exhibit 22-3.)

Table 22-1

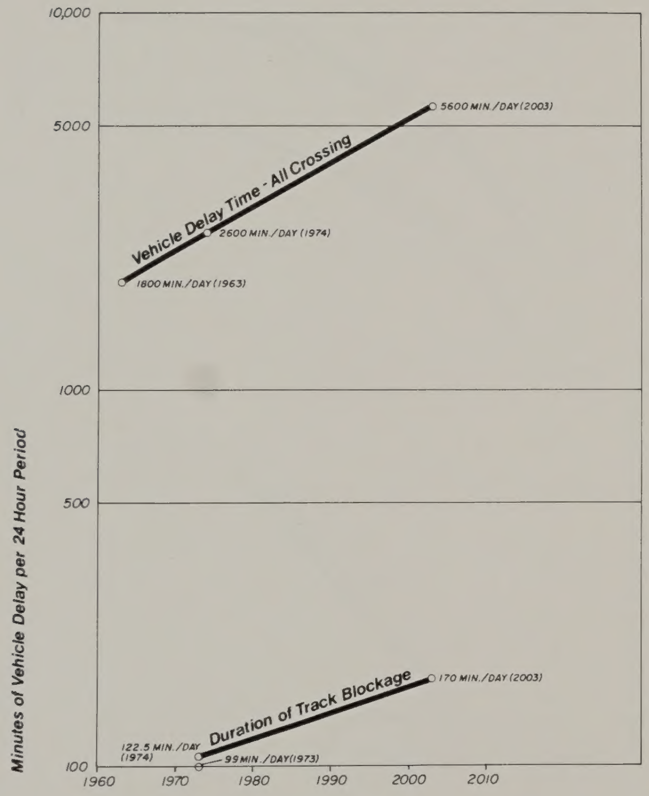
AVERAGE DAILY TRAFFIC GROWTH ALONG FIFTH STREET IN ELKO

Year	On 5th Street, State Rte. 46, 100 Ft. South of Idaho Street	On 5th Street, State Rte. 46, 100 Ft. South of Bridge Across Humboldt River.
1961	3,726	4,049
1962	3,843	3,724
1963	4,049	4,003
1964	3,802	3,740
1965	3,986	3,921
1966	4,155	4,505
1967	4,100	4,580
1968	4,450	4,480
1969	5,100	4,200
1970	5,425	4,525
1971	5,500	4,600
1972	-	-
1973	6,260	6,550

Source: Nevada State Highway Department



22-2. VEHICLES CROSSING TRACKS AND DELAYED BY TRAINS, 1963-2003



22-3. DURATION OF TRACK BLOCKAGE AND VEHICLE DELAY BY TRAINS, 1963-2003

Table 22-2 summarizes 24-hour delay data for rail crossings on Fifth Street. Approximately one-third of all traffic crossing the tracks uses Fifth Street. Present traffic at other crossings was compared to the Fifth Street crossing volumes as follows (ratios of given street to Fifth Street volume for Southern Pacific crossings):

Street	Ratio to Fifth Street Traffic
Third	.61
Fourth	.36
Fifth	1.00
Sixth	.33
Ninth	.41
Eleventh	.26
TOTAL	2.97

Tables 22-3, 22-4, and 22-5, show time of day and duration of track blockage and numbers of vehicles delayed for each train passing Fifth Street during three 24-hour periods -- April 18, 1963; June 8, 1972; and July 9, 1974. Table 22-6 provides similar detailed breakdown for Ninth Street on July 10, 1974. (Up to 30 cars may be delayed by a single train at Fifth Street and up to 20 cars per train at Ninth Street.)

Table 22-7 summarizes recent railroad-vehicle accident data for Elko. State data checked against local police department records appears to provide a good approximation of present accident activity. The state historic accident data are categorized by severity -- property damage, injury and fatality. City records appear more complete than the State's in terms of number of accidents recorded in any one year and the number of years for which data is available. However, City records do not distinguish injury from property damage accidents.

Approximately one-third of rail/vehicle and rail/pedestrian accidents involve injury and approximately one-third of the injury accidents involve a fatality. Without corrective action, doubling of cross-track traffic volume between 1973 and 2003 and 40 percent increase in train blockage would increase accident exposure by about 140 percent. Before such danger is experienced, however, it is likely that protective crossing gates would be installed, reducing accident rates to 5-15 percent of their current levels.

Accident exposure would drop to near zero with the north or south bank alternatives. The Silver Street alternative would leave four at-grade crossings estimated to handle 30 percent of the north-south traffic. By providing protective gates at these four crossings, accident hazards for the Silver Street alternative should be only 2-5 percent of the current danger levels.

RAIL/RIVER CROSSING LOCATION

The expense of bridge construction and river crossing traffic projections of 31,000 ADT in 2003, suggest that no more than two crossings would be

Table 22-2

TRAVEL DELAY AT 5TH STREET GRADE CROSSINGS

	1963 Survey*	1972 Survey*	1974 Survey*	2003 Projection**
Longest period of blockage caused by single train movement	7 min 24 sec	7 min 07 sec	17 min 20 sec	-
Number of trains and switching movements	38	36	44	44****
Total duration of blockage of north-south streets caused by all trains and switch engine mounts during 24-hour period	1 hr 31 min	1 hr 39 min	2 hr 2½ min	2 hr 50 min
Total vehicles delayed during 24-hour period	181	321	425	2083
Total vehicles crossing SP tracks	3535	6304	6514	15112
Total vehicles crossing WP tracks	-	-	7147	16578
Total vehicle hours of delay during 24-hour period***	600	-	865	1870

*Source: Nevada State Highway Department survey, April 18-19, 1963; Chilton Engineering surveys, June 8, 1972 and July 9, 1974. Number of vehicles on Fifth Street represents approximately 33% of total traffic crossing railroad tracks.

**Reflects traffic volumes as projected from past trends and a medium population growth rate 2.75% average annual rate between 1973 and 2003. In reality, the untenable delays involved may, in the no build case, induce shifts in the City's land use patterns before 2003 to circumvent the disruptive effects of the rail traffic.

***Assumes average delay of 2.2 minutes per vehicle delayed during 24-hour period. These relationships were assumed to hold for future projection under the no-build alternative.

****Trains are projected to increase in length, but not in number. In reality, the number of trains may increase to partially offset the projected increase in train length.

Table 22-3

ELKO RAILROAD GRADE CROSSING STUDY
AT WP AND SP RAILROAD GRADE CROSSINGS AND SR 46 (FIFTH STREET)
April 18 - 19, 1963

HOUR	Total Vehicles Crossing SP Tracks			WP EASTBOUND TRACKS				SP WESTBOUND TRACKS			
	NB	SB	Total	Time of Train S = Stopped N= No Stop	Type Train and Direction	Total Time Crossing was Blocked	Total Vehicles Delayed	Time of Train S = Stopped N = No Stop	Type Train and Direction	Total Time Crossing was Blocked	Total Vehicles Delayed
12 Mid.- 1 AM	10	12	22	12:15 A-N	F-EB	26 Sec	None	-	-	-	-
1 AM - 2 AM	5	8	13	1:40 A-N	F-EB	3 Min 19 Sec	2	1:39 A-N	P-WB	27 Sec	None
2 AM - 3 AM	2	6	8	2:17 A-N	F-EB	2 Min 45 Sec	None	2:45 A-N	F-WB	1 Min 31 Sec	None
3 AM - 4 AM	3	3	6	3:55 A-S	P-EB	1 Min 18 Sec	None	3:36 A-N	F-WB	1 Min 28 Sec	None
4 AM - 5 AM	6	2	8	-	-	-	-	-	-	-	-
5 AM - 6 AM	9	6	15	5:27 A-N 5:46 A-N	F-EB F-EB	2 Min 37 Sec 3 Min 31 Sec	2 None	-	-	-	-
6 AM - 7 AM	27	29	56	-	-	-	-	-	-	-	-
7 AM - 8 AM	71	87	158	7:00 A-N 7:09 A-N	F-EB F-EB	2 Min 56 Sec 3 Min 3 Sec	10 6	7:36 A-N	F-WB	5 Min 18 Sec	6
8 AM - 9 AM	96	97	193	8:58 A-N	F-EB	2 Min 48 Sec	6	8:04 A-N 8:12 A-N	F-WB S-WB	1 Min 55 Sec 9 Sec	11 3
9 AM -10 AM	123	70	193	9:22 A-N 9:58 A-N	F-EB F-EB	3 Min 14 Sec 4 Min	14 14	A-N	F-WB	1 Min 33 Sec	5
10 AM - 11 AM	126	93	219	10:10 A-N 10:22 A-N	S-EB S-WB	10 Sec 10 Sec	None None	- -	- -	- -	- -
11 AM-12 Noon	122	101	223	-	-	-	-	-	-	-	-
12 Noon - 1 PM	182	141	323	12:10 P-N 12:30 P-N	F-EB F-EB	4 Min 19 Sec 3 Min 30 Sec	23 13	12:12 P-N 12:34 P-N	P-WB F-WB	1 Min 2 Min 40 Sec	None 7
1 PM - 2 PM	99	98	197	1:59 P-S	F-EB	7 Min 24 Sec	9	1:21 P-N 1:33 P-N	F-WB F-WB	40 Sec 1 Min 48 Sec	2 5
2 PM - 3 PM	98	90	188	-	-	-	-	2:34 P-N 2:46 P-N	S-EB S-WB	6 Sec 16 Sec	None 1
3 PM - 4 PM	131	130	261	-	-	-	-	-	-	-	-
4 PM - 5 PM	233	171	404	-	-	-	-	5:02 P-N 5:15 P-N	S-EB S-WB	4 Sec 7 Sec	None 2
5 PM - 6 PM	196	142	338	-	-	-	-	-	-	-	-
6 PM - 7 PM	106	88	194	-	-	-	-	-	-	-	-
7 PM - 8 PM	126	85	211	7:51 P-N	F-EB	4 Min 50 Sec	4	7:49 P-N	F-WB	6 Min 48 Sec	8
8 PM - 9 PM	55	32	87	8:43 P-N 8:59 P-N	F-EB F-EB	3 Min 45 Sec 3 Min 48 Sec	10 4	-	-	-	-
9 PM -10 PM	52	39	91	-	-	-	-	-	-	-	-
10 PM - 11 PM	36	50	86	10:29 P-N	F-EB	3 Min 25 Sec	9	10:15 P-N 10:39 P-N	P-WB F-WB	3 Min 20 Sec 46 Sec	5 None
11 PM - 12 Mid	25	16	41	-	-	-	-	-	-	-	-
24 HOURS TOTALS	1939	1596	3535	20 Trains 18 No Stop 2 Stopped	17 Freight 1 Pass 2 Switch	61 Min 18 Sec	126	18 Trains 18 No Stop	10 Freight 3 Pass 5 Switch	29 Min 56 Sec	55

F = Freight
P = Passenger
S = Switch Engine
EB = Eastbound
WB = Westbound
N = No Stop in Crossing
S = Stopped in Crossing

Source: Planning Survey Divn., Nevada State Highway Dept.

Table 22-4

ELKO RAILROAD GRADE CROSSING STUDY
AT WP AND SP RAILROAD GRADE CROSSINGS AND SR 46 (FIFTH STREET)

June 8, 1972 (Thursday)

HOUR	Total Vehicles Crossing SP Tracks			WP EASTBOUND TRACKS				SP WESTBOUND TRACKS			
	NB	SB	Total	Time of Train S = Stopped N = No Stop	Type Train and Direction	Total Time Crossing was Blocked	Total Vehicles Delayed	S = Stopped N =No Stop	Type Train and Direction	Total Time Crossing was Blocked	Total Vehicles Delayed
12 Mid - 1 AM	37	31	68	12:41 A-N	F-SP	4 Min 4 Sec	4	12:19 A-N	F-SP	3 Min 23 Sec	4
1 AM - 2 AM	13	10	23	-	-	-	-	-	-	-	-
2 AM - 3 AM	19	9	28	-	-	-	-	-	-	-	-
3 AM - 4 AM	9	8	17	3:05 A-N	SP-F	5 Min 29 Sec	1	3:32 A-N 3:48 A-N	WP-F SP-F	1 Min 33 Sec 3 Min 53 Sec	-
4 AM - 5 AM	13	21	34	-	-	-	-	4:40 A-N	WP-F	2 Min 20 Sec	2
5 AM - 6 AM	56	29	85	5:45 A-N	SP-F	4 Min 57 Sec	7	5:11 A-N 5:26 A-N	WP-F SP-F	7 Min 07 Sec 2 Min 27 Sec	2 6
6 AM - 7 AM	83	49	132	6:42 A-N	SP-F	4 Min 01 Sec	13	6:34 A-N	WP-F	4 Min	10
7 AM - 8 AM	123	69	192	7:53 A-N	E-SP	3 Min 25 Sec	16	-	-	-	-
8 AM - 9 AM	206	117	323	8:50 A-N	E-SP	4 Min 36 Sec	29	-	-	-	-
9 AM -10 AM	207	144	351	-	-	-	-	9:30 A-N 9:37(est) 9:45(est) 9:52	S-EB S-WB S-EB F-WB-SP	34 Sec 45 Sec 41 Sec 3 Min 6 Sec	7 (NR) 14 20
10 AM - 11 AM	184	120	304	10:35 A-N	E-WP	2 Min 30 Sec	5	10:10 A-N 10:20 A-N	W-SP S-WB	2 Min 7 Sec 31 Sec	4 7
11 AM - 12 Noon	191	139	330	-	-	-	-	11:40 SP	-	2 Min 16 Sec	5
12 Noon-1 PM	252	222	474	-	-	-	-	12:43 WP	-	5 Min 25 Sec	31
1 PM - 2 PM	290	224	514	-	-	-	-	-	-	-	-
2 PM - 3 PM	200	165	365	-	-	-	-	-	-	-	-
3 PM - 4 PM	264	192	456	3:40 SP	-	2 Min 39 Sec	26	3:25 SP	-	2 Min 10 Sec	20
4 PM - 5 PM	260	250	510	-	-	-	-	-	-	-	-
5 PM - 6 PM	273	239	512	-	-	-	-	-	-	-	-
6 PM - 7 PM	204	134	338	-	SE SW SE SW	15 Sec 5 Sec 10 Sec 5 Sec	3 - - -	-	-	-	-
7 PM - 8 PM	192	162	354		SP	4 Min 2 Sec	13	SP	-	2 Min 07 Sec	12
8 PM - 9 PM	188	176	364	SP	-	4 Min 14 Sec	32	-	-	-	-
9 PM -10 PM	135	96	231	-	-	-	-	-	-	-	-
10 PM - 11 PM	135	85	220	P-SP F-WP	-	39 Sec 1 Min 31 Sec	1 4	SP	-	3 Min 10 Sec	12
11 PM - 12 Mid	49	30	79	-	-	-	-	SP SP	-	5 Min 13 Sec 2 Min 56 Sec	7 4
24 HOURS TOTALS	3583	2721	6304	16 Trains None Stopped	11 Freight 1 Pass 4 Switch	42 Min 42 Sec	154	20 Trains None Stopped	16 Freight 0 Pass 4 Switch	56 Min 04 Sec	167

F = Freight
P = Passenger
S = Switch Engine

EB = Eastbound
WB = Westbound
N = No Stop in Crossing
S = Stopped in Crossing

Source: Planning Survey Divn., Nevada State Highway Dept.

Table 22-5

ELKO RAILROAD GRADE CROSSING STUDY
AT WP AND SP RAILROAD GRADE CROSSINGS AND SR 46 (FIFTH STREET

July 9, 1974 (Tuesday)

HOUR	Total Vehicles Crossing SP Tracks			WP EASTBOUND TRACKS				SP WESTBOUND TRACKS			
	NB	SB	Total	Time of Train S = Stopped N = No Stop	Type Train and Direction	Total Time Crossing was Blocked	Total Vehicles Delayed	Time of Train S = Stopped N = No Stop	Type Train and Direction	Total Time Crossing was Blocked	Total Vehicles Delayed
12 Mid. - 1 AM	27	42	69	12:20 - S 12:40 - N	F-EB F-EB	17 Min 20 Sec 3 Min 45 Sec	12 1	-	-	-	None
1 AM -2 AM	14	7	21	-	-	-	None	1:58 - N	P-WB (Amtk)	45 Sec	None
2 AM -3 AM	5	7	12	-	-	-	None	-	-	-	None
3 AM -4 AM	9	12	21	-	-	-	None	3:12 -N	F-WB	1 Min 55 Sec	None
4 AM - 5 AM	17	6	23	4:30 - N	F-EB	2 Min 50 Sec	2	4:21 - N 4:48 - N	F-WB F-WB	1 Min 45 Sec 4 Min 58 Sec	None 2
5 AM -6 AM	28	13	41	5:10 - N	F-EB	5 Min 40 Sec	3	-	-	-	None
6 AM - 7 AM	98	78	176	-	-	-	None	6:26 - N 6:45 - N	F-WB F-WB	1 Min 40 Sec 9 Min 34 Sec	6 16
7 AM - 8 AM	185	119	304	-	-	-	None	7:07 - N	F-WB	2 Min 30 Sec	2
8 AM - 9 AM	222	145	367	-	-	-	None	-	-	-	None
9 AM -10 AM	192	132	324	-	-	-	None	9:13 -N	F-WB	3 Min 55 Sec	20
10 AM - 11 AM	213	157	370	10:08 - N 10:16 - N 10:31 - N	S-EB S-WB F-EB	40 Sec 40 Sec 2 Min 30 Sec	6 9 30	10:27 -N 10:44 - S 10: 47 -N	F-WB F-WB F-WB	2 Min 45 Sec 2 Min 15 Sec 4 Min 15 Sec	12 5 27
11 AM - 12	226	162	388	11:20 - N 11:48 - N	F-EB F-EB	2 Min 1 Min 10 Sec	14 3	-	-	-	None
12 Noon - 1 PM	283	236	519	-	-	-	None	12:50 - N	S-EB	10 Sec	3
1 PM - 2 PM	314	235	549	-	-	-	None	1:04 - N	S-WB	05 Sec	3
2 PM - 3 PM	269	192	461	-	-	-	None	-	-	-	None
3 PM - 4 PM	6	8	14	-	-	-	None	3:42 - N 3:56 - N	P-WB F-WB	1 Min 1 Min 20 Sec	1 None
4 PM - 5 PM	277	231	508	4:45 - N	F-EB	2 Min 35 Sec	42	-	-	-	None
5 PM - 6 PM	314	258	572	5:15 - N	F-EB	1 Min 35 Sec	17	5:52 - N 5:58 - N	F-WB S-EB	55 Sec 03 Sec	11 None
6 PM - 7 PM	308	192	500	6:12 - N 6:34 - N 6:47 - N	F-EB F-EB S-WB	5 Min 30 Sec 2 Min 50 Sec - 30 Sec	32 34 3	-	-	-	None
7 PM - 8 PM	228	174	402	-	-	-	None	7:32 - N 7:57 - N	F-WB F-WB	4 Min 10 Sec 3 Min 40 Sec	16 26
8 PM - 9 PM	166	119	285	-	-	-	None	8:12 - N 8:40 - N	F-WB F-WB	1 Min 30 Sec 8 Min 30 Sec	7 32
9 PM - 10 PM	175	126	301	-	-	-	None	9:22 - N 9:48 - N	F-WB F-WB	40 Sec 1 Min 55 Sec	2 8
10 PM - 11 PM	93	92	185	10:18 - N 10:55 - N	P-EB S-EB	1 Min 10 Sec 30 Sec	2 None	-	-	-	None
11 PM - 12 Mid.	54	48	102	11:02 - S 11:05 - S 11:11 - N 11:26 - N 11:42 - N	S-EB S-EB S-WB F-EB F-EB	30 Sec 3 Min 30 Sec 30 Sec 3 Min 20 Sec 3 Min 40 Sec	1 7 1 4 3	-	-	-	None
24 HOURS TOTALS	3723	2791	6514	21 Trains 18 No Stop 3 Stopped	13 Frt. 1 Psgr. 7 Swt.	62 Min 45 Sec	226	23 Trains 22 No Stop 1 Stopped	18 Frt. 2 Psgr. 3 Swt.	59 Min 52 Sec	199

F = Freight
P = Passenger
S = Switch Engine

EB = Eastbound
WB = Westbound
N = No Stop in Crossing
S = Stopped in Crossing

Source: Planning Survey Divn., Nevada State Highway Dept.

Table 22-6

ELKO RAILROAD GRADE CROSSING STUDY
AT WP AND SP RAILROAD GRADE CROSSINGS AND SR 46 (NINTH STREET)
July 10, 1974 (Wednesday)

HOUR	Total Vehicles Crossing SP Tracks			WP EASTBOUND TRACKS				SP WESTBOUND TRACKS			
	NB	SB	Total	Time of Train S = Stopped N = No Stop	Type Train and Direction	Total Time Crossing was Blocked	Total Vehicles Delayed	S = Stopped N = No Stop	Type Train and Direction	Total Time Crossing was Blocked	Total Vehicles Delayed
12 Mid - 1 AM	10	17	27	12 :30 - N	F-EB	3 Min 5 Sec	1	-	-	-	None
1 AM -2 AM	3	7	10	-	-	-	None	1:46 - N	F-WB	2 Min 30 Sec	None
2 AM -3 AM	5	8	13	-	-	-	None	2:46 - N	F-WB	3 Min 25 Sec	1
3 AM -4 AM	6	8	14	-	-	-	None	3:42 - N 3:56 - N	P-WB F-WB	1 Min 1 Min 20 Sec	1 None
4 AM - 5 AM	5	6	11	4:55 - N	F-EB	4 Min	None	4:48 - N 4:55 - N	F-WB F-WB	1 Min 15 Sec 1 Min 25 Sec	None None
5 AM - 6 AM	28	13	41	-	-	-	None	-	-	-	None
6 AM - 7 AM	57	29	86	-	-	-	None	6:51 - S	F-WB	9 Min 40 Sec	11
7 AM - 8 AM	100	59	159	7:08 - N	F-EB	3 Min 50 Sec	4	7:13 - N 7:58 - N	F-WB F-WB	1 Min 17 Sec 2 Min 32 Sec	2 12
8 AM - 9 AM	78	60	138	-	-	-	None	-	-	-	None
9 AM -10 AM	116	84	200	-	-	-	None	9:21 - N 9:31 - N	F-WB F-WB	1 Min 50 Sec 3 Min 15 Sec	8 16
10 AM - 11 AM	115	81	196	10:31 - N	F-EB	3 Min 40 Sec	8	-	-	-	None
11 AM - 12 Noon	118	96	214	-	-	-	None	-	-	-	None
12 Noon - 1PM	133	120	253	12:30 - S 12:58 - N	S-EB F-EB	7 Min 10 Sec 4 Min	16 15	-	-	-	None
1 PM - 2PM	177	123	300	1:17 - N 1:24 - N	F-EB F-EB	1 Min 45 Sec 25 Sec	12 1	-	-	-	None
2 PM - 3 PM	126	111	237	-	-	-	None	-	-	-	None
3 PM - 4 PM	138	122	260	-	-	-	None	-	-	-	None
4 PM - 5 PM	115	140	255	-	-	-	None	-	-	-	None
5 PM - 6 PM	129	139	268	5:16 - N 5:24 - N	F-EB F-EB	1 Min 40 Sec 1 Min 40 Sec	8 3	5:40 - N	F-WB	1 Min 10 Sec	3
6 PM - 7 PM	117	115	232	6:02 - N	E-EB	3 Min 40 Sec	13	-	-	-	None
7 PM - 8 PM	95	81	175	7:16 - N 7:24 - N 7:53 - N	S-EB S-WB F-EB	10 Sec 10 Sec 3 Min 20 Sec	None None 5	7:58 - N -	F-WB -	2 Min 35 Sec -	7
8 PM - 9 PM	87	91	178	-	-	-	None	8:34 - S	F-WB	8 Min 5 Sec	19
9 PM - 10 PM	72	74	146	-	-	-	None	-	-	-	None
10 PM - 11 PM	46	54	100	10:02 - N	P-EB	1 Min	None	-	-	-	None
11 PM - 12 Mid	41	36	77	-	-	-	None	11:44 - N	F-WB	2 Min 10 Sec	3
24 HOURS TOTALS	1917	1674	3591	15 Trains 14 No Stop 1 Stopped	11 Frt. 1 Psgr. 3 Swt.	39 Min 35 Sec	86	15 Trains 13 No Stop 2 Stopped	14 Frt. 1 Psgr.	43 Min 29 Sec	83

F = Freight
P = Passenger
S = Switch Engine

EB = Eastbound
WB = Westbound
N = No Stop in Crossing
S = Stopped in Crossing

Source: Planning Survey Divn., Nevada State Highway Dept.

justified during the design life of the project. Ideally, river cross-overs and railway grade separations would be constructed on the same north-south streets so as to minimize the impact of the parallel river and rail barriers. Where existing river bridges are to be removed, the possibility of placing them in new, more optimal locations was explored. Consideration was also given to future travel demands and the compatibility with long range planning objectives for Elko.

The North and South Bank alternatives both require the replacement of the existing river crossings. Neither existing river bridge is high or low enough to be utilized for a railroad grade separation. The Silver Street alternative would not require demolition of the existing river bridges. However, the 15 ton load limit and narrow width (two lane) on the existing Ninth Street bridge restricts the bridge's long term utility in the City's major thoroughfare system. To couple the Ninth Street existing bridge with an Eighth Street-Lamoille Road railroad overpass at Silver Street would involve a circuitous approach and safety hazard to achieve railway clearance and grade criteria. The Silver Street alternative, therefore, assumes replacement of the Ninth Street bridge, either in the same general location or at another more optimal location.

Table 22-7

ELKO TRAIN-RELATED VEHICLE AND PEDESTRIAN ACCIDENTS

	Number Accidents	Number Injuries	Number Fatalities
Past Years			
1971	3	2	0
1972	5	2	0
1973	3	1	0
Total 1971-73	11	5	0
Average Annual	3.7 (4.0)	2.7	0 (0.4)

Source: 1971-73 data from Nevada State Highway Department. Figures in parentheses from City Police Department, 1968-73 period.

The justification for continued reliance on Fifth Street as the principal north-south river/rail crossing is clear.

- Fifth Street handles over two-thirds of the present north-south river traffic.
- Fifth Street is a designated state highway.
- The roadway is lined with commercial establishments whose vitality depends on the passing motorist.
- Fifth Street has continuity through the City.
- Fifth Street forms a recognized boundary between residential area, whereas any alternate route would involve disruption of neighborhoods.

Alternative locations evaluated in detail for the second river/raid crossing to replace Ninth Street were:

- A new Eighth Street-Lamoille Road bridge, and
- A Twelfth Street location involving a low river bridge and a railroad underpass.

Other alternative locations east of Twelfth Street and west of Fifth Street -- Civic Center Drive southerly extension, I-80 access road southerly extension, and Hot Hole crossing to State Route 51 -- appeared less centrally located for residents south of the river.

River Crossing Origin-Destination Survey and Forecasts

An origin-destination survey was performed at the Fifth and Ninth Street bridges to provide an understanding of present bridge usage, i.e., where trips originate and terminate, and the relationship of crossing volumes to land use. Based on that analysis and using future growth projections, year 2003 trip crossings were forecast between the north and south sides of the river. All forecasted trips were assumed to originate at, or be destined to a home south of the river. This assumption is justified by approximately 90 percent of typical trips originating or are destined to a home. In addition, the area south of the river is predominatly residential, with very few commercial or industrial facilities.

Existing travel desire lines for 1974 from the origin-destination survey, and year 2003 travel desire lines, based on population forecasts, are summarized in Exhibits 22-4 and 22-5 respectively. In 1974 the river crossing demand is concentrated but by 2003 it will be more dispersed.

The optimum location for the eastern crossing, i.e., at Eighth Street-Lamoille Road or Twelfth Street, may be viewed as a function of projected existing growth south of the river.

Table 22-8 and Exhibit 22-6 illustrate the allocation of year 2003 traffic to Fifth Street and Eighth-Lamoille Road bridges. Traffic distribution in 2003 reflect the fact that a new, better designed bridge at Eighth-Lamoille Road would attract a greater share of the cross-river traffic than present travel patterns. Table 22-9 and Exhibit 22-7 illustrate the allocation of year 2003 traffic to Fifth Street and Twelfth Street bridges.

IMPACTS OF ALTERNATIVE RIVER CROSSING SITES

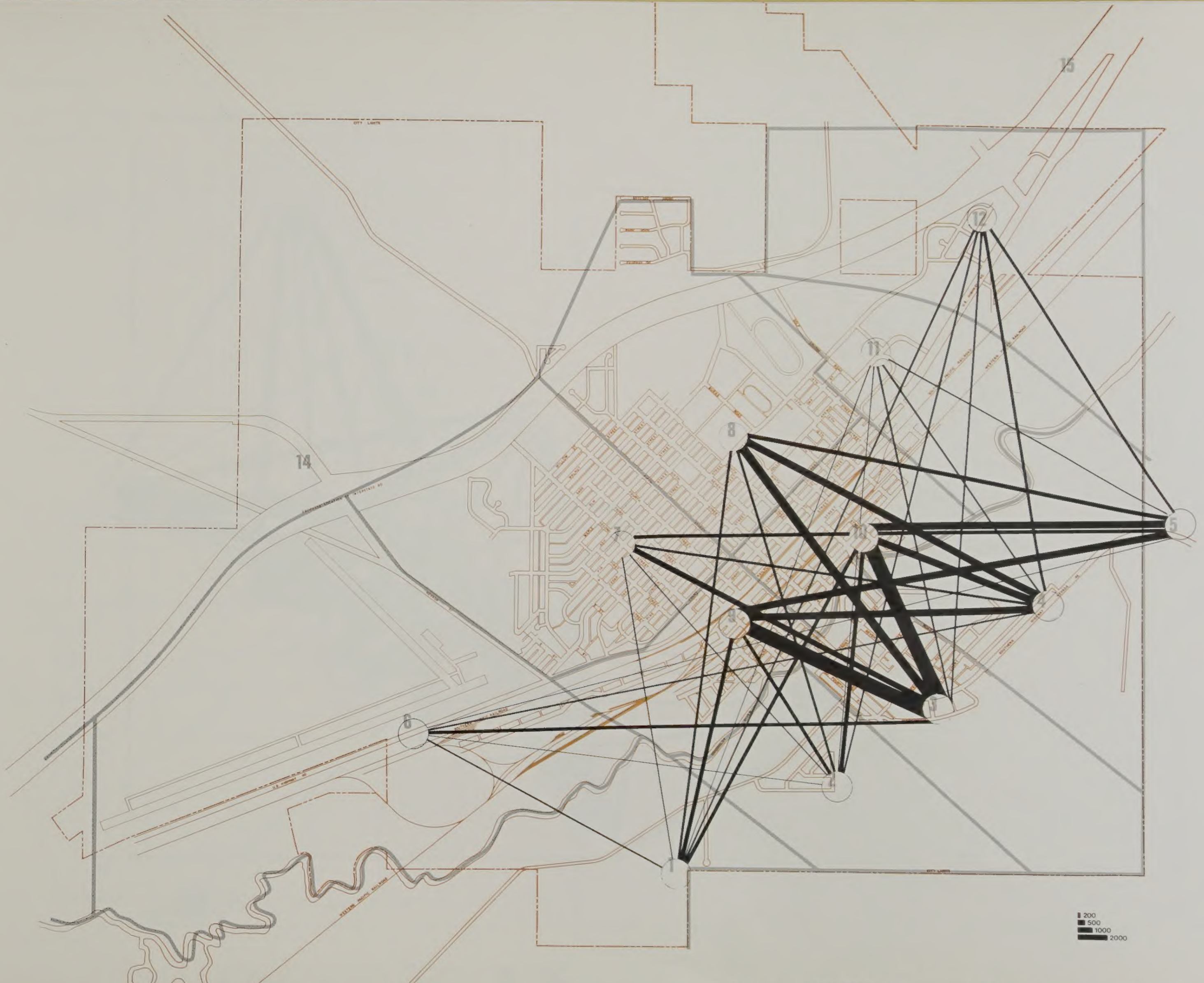
It was found that with optimistic assumptions for growth in the Spring Creek area and in the areas of the City south of the river, the utilization of a Twelfth Street bridge would be perhaps 20 percent lower than for a Eighth Street-Lamoille Road bridge (Table 22-10). No clear preference could be established from a traffic utilization standpoint. Therefore, the principal considerations for selecting a Twelfth Street river crossing site would appear to depend on other factors -- such as the relative cost of the alternatives, dislocation, overpass construction costs, traffic intrusion into existing residential neighborhoods, proximity to the South Side School and the desirability of having two overpasses relatively close to each other as would be the case if the Eighth Street-Lamoille Road crossing was selected. The advantages of each alternative, which are explored more fully in the sections dealing with land use, relocation, schools, and conceptual engineering, are summarized below:

Twelfth Street Crossing

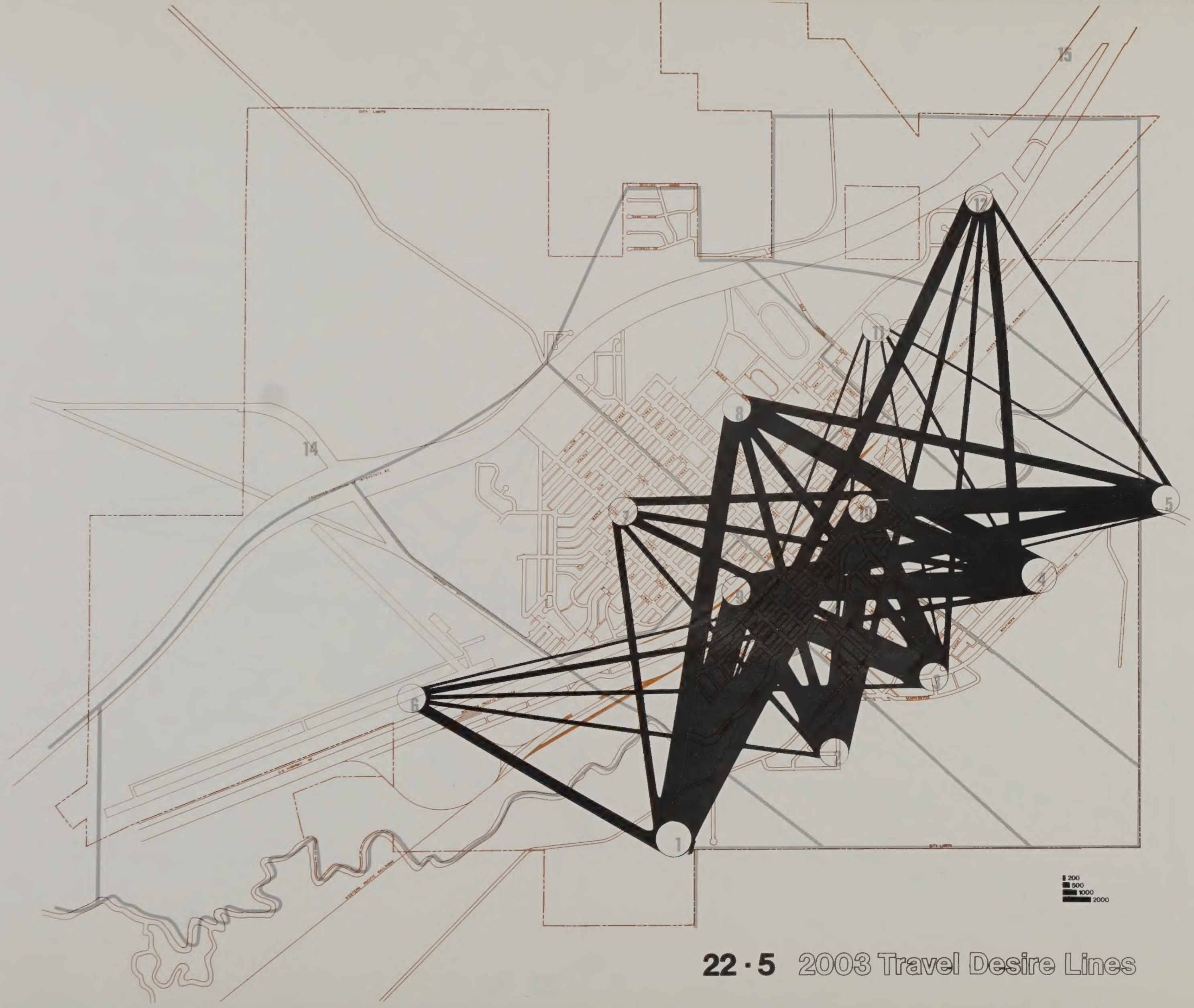
- Displaces two homes, due to approaches, versus about 16 homes for the Eighth-Lamoille alternative.
- Exposes only about five homes between Route 46 and U.S. 40 to traffic noise, safety hazards and visual impact versus about 35 homes for the Eighth-Lamoille alternate.
- Keeps heavy traffic away from Southside Elementary School, an unavoidable problem with the Eighth-Lamoille alternate.
- Allows more creative and extensive utilization of river front land for park use in the vicinity of Eighth Street and Lamoille Road.
- Provides direct access to the Hospital/High School area for traffic from the south side.
- Provides better access to outlying shopping areas than the other alternative.

Eighth Street Lamoille Road Crossing

- Focuses traffic on the downtown area, which should reinforce its eco-



22 · 4 1974 Travel Desire Lines



22 · 5 2003 Travel Desire Lines

Table 22-8

PERCENT OF RIVER CROSSING TRAFFIC PROJECTED TO USE EIGHTH-LAMOILLE BRIDGE

Origin Zone South of the River	Attraction Zone North of the River									
	6	7	8	9	10	11	12	13	14	15
1	3	18	19	3	11	48	17	0	0	90 (19)
2	0	19	50 (28)	13	50 (24)	50 (37)	50 (36)	0	14	90 (17)
3	14	13	50 (48)	13	50 (34)	90 (50)	90 (50)	17	58	90 (30)
4	60 (27)	90 (65)	63	50 (33)	70	82	87	62	58	100 (80)
5	0	26	55	13	50 (35)	100 (72)	100 (67)	13	0	60 (29)

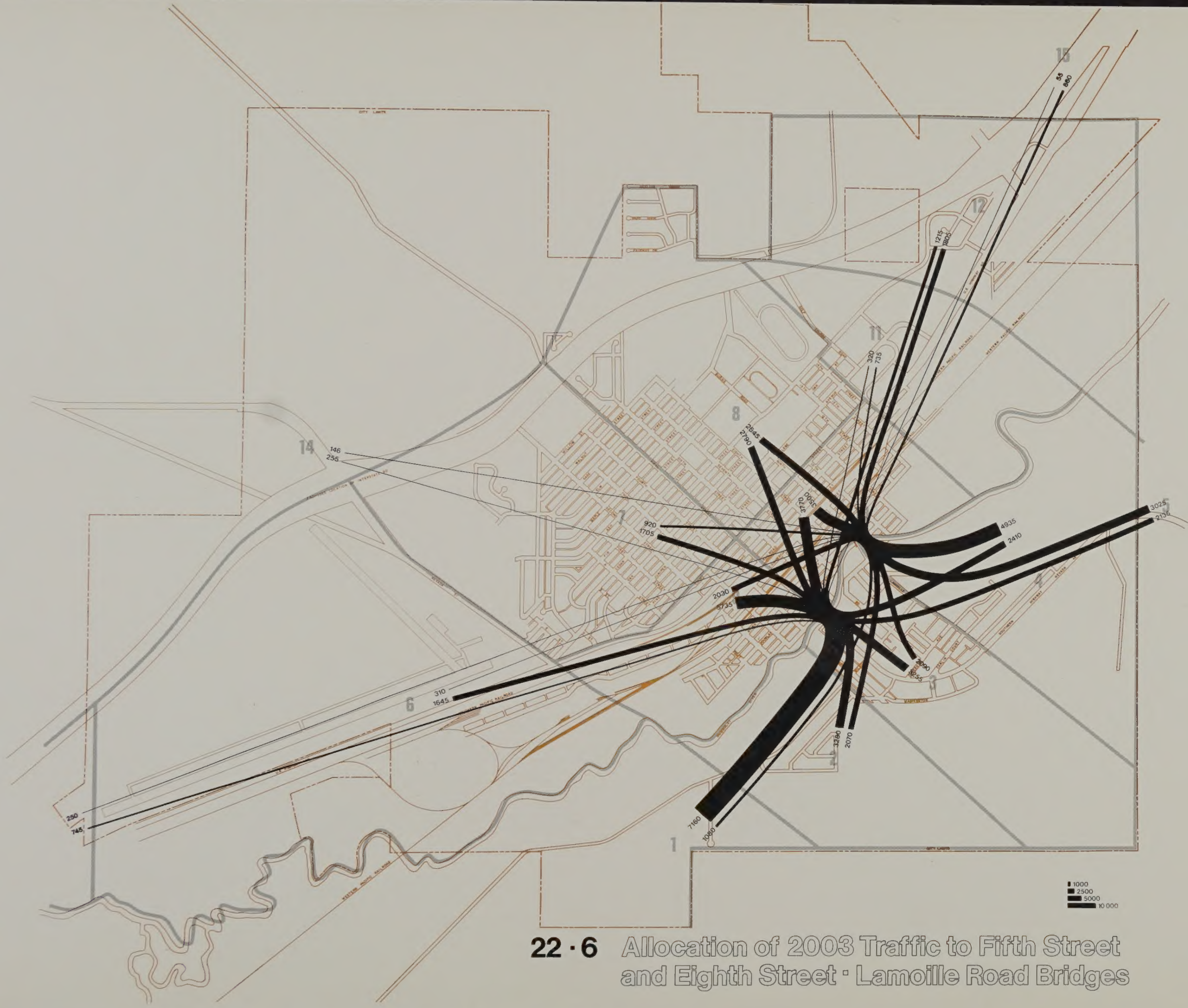
Note: Figures assume completion of Fifth and Eighth-Lamoille bridges. The numbers in parentheses reflect 1974 conditions recorded by origin-destination survey.

Table 22-9

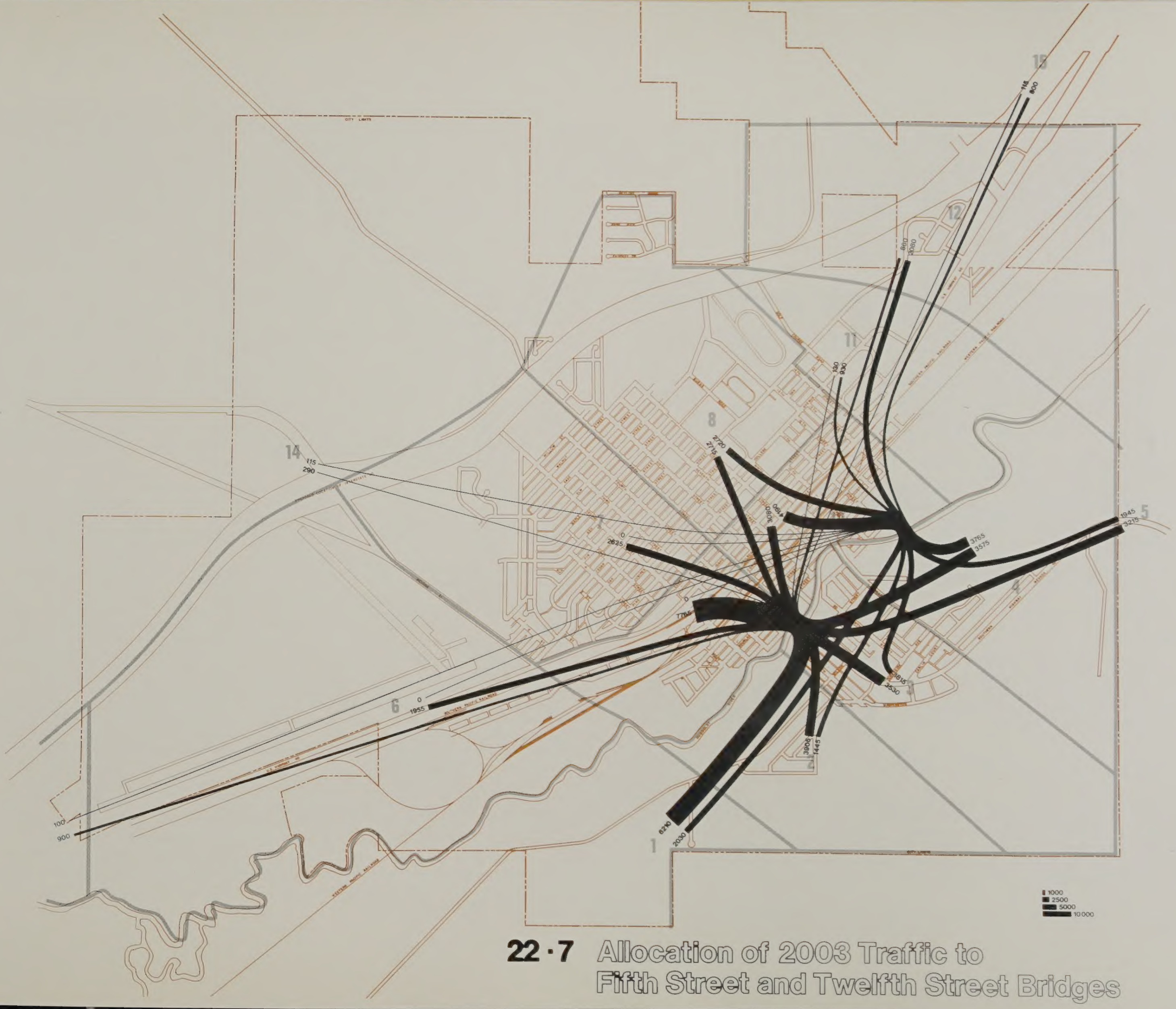
PERCENT OF RIVER CROSSING TRAFFIC PROJECTED TO USE TWELFTH STREET BRIDGE

Origin Zone South of the River	Attraction Zone North of the River									
	6	7	8	9	10	11	12	13	14	15
1	0	0	50	0	25	70	70	0	0	70
2	0	0	50	0	25	70	70	0	0	70
3	0	0	50	0	50	100	100	0	0	100
4	0	0	50	0	100	100	100	0	0	100
5	0	0	60	0	100	100	100	0	0	100

Note: Figures assume completion of Fifth and Twelfth Street bridges.



22 · 6 Allocation of 2003 Traffic to Fifth Street and Eighth Street · Lamoille Road Bridges



22 · 7 Allocation of 2003 Traffic to Fifth Street and Twelfth Street Bridges

Table 22-10

PROJECTED YEAR 2003 AVERAGE DAILY TRAFFIC VOLUMES FOR ALTERNATIVE RIVER CROSSINGS

Alternative	Moving Lanes	Fifth Street	Eighth Street/ Lamoille Road	Twelfth Street
Fifth Street Only	4	31,438		
Fifth & Eighth/Lamoille	2	18,237	13,201	
Fifth & Twelfth	2	20,434		11,004

Note: Roadway capacity may be estimated at 1500 vehicles per 2 lanes per hour; 6-8 percent of average daily traffic is typically experienced in the peak hour.

nomic position in comparison to outlying commercial areas.

- Provides better relief than Twelfth Street to anticipated congestion on Fifth Street by 2003.
- Provides one continuous north-south thoroughfare between Route 46 and the Indian Colony, while Twelfth Street traffic must jog to Thirteenth for northerly access.
- Retains established north-south thoroughfare on Lamoille Road.
- Contained in the Elko General Plan

Hot Hole Road

The eventual provision for a western overpass, i.e., on Hot Hole Road, appears of particular importance, to accommodate projections of growth in the southwestern portion of the city. Construction of a Hot Hole crossing to relieve congestion on Fifth Street and Bullion Road might well be justified prior to or in addition to widening the Twelfth Street crossing to four lanes.

EXISTING CBD CIRCULATION AND PARKING

The future vitality of the CBD, a principal objective of the Elko railroad relocation project, depends not only on the removal of the blighting influence of railroad noise, vibration and visual intrusion from the downtown area, but also on using the vacated railroad land as a catalyst in development of the downtown area. Upgrading the traffic circulation and parking arrangement in the central area will be a key component in any revitalization program. This section considers the Central Business District's present traffic access, circulation and parking situation and ways in which it could be improved with relocation of the railroads.

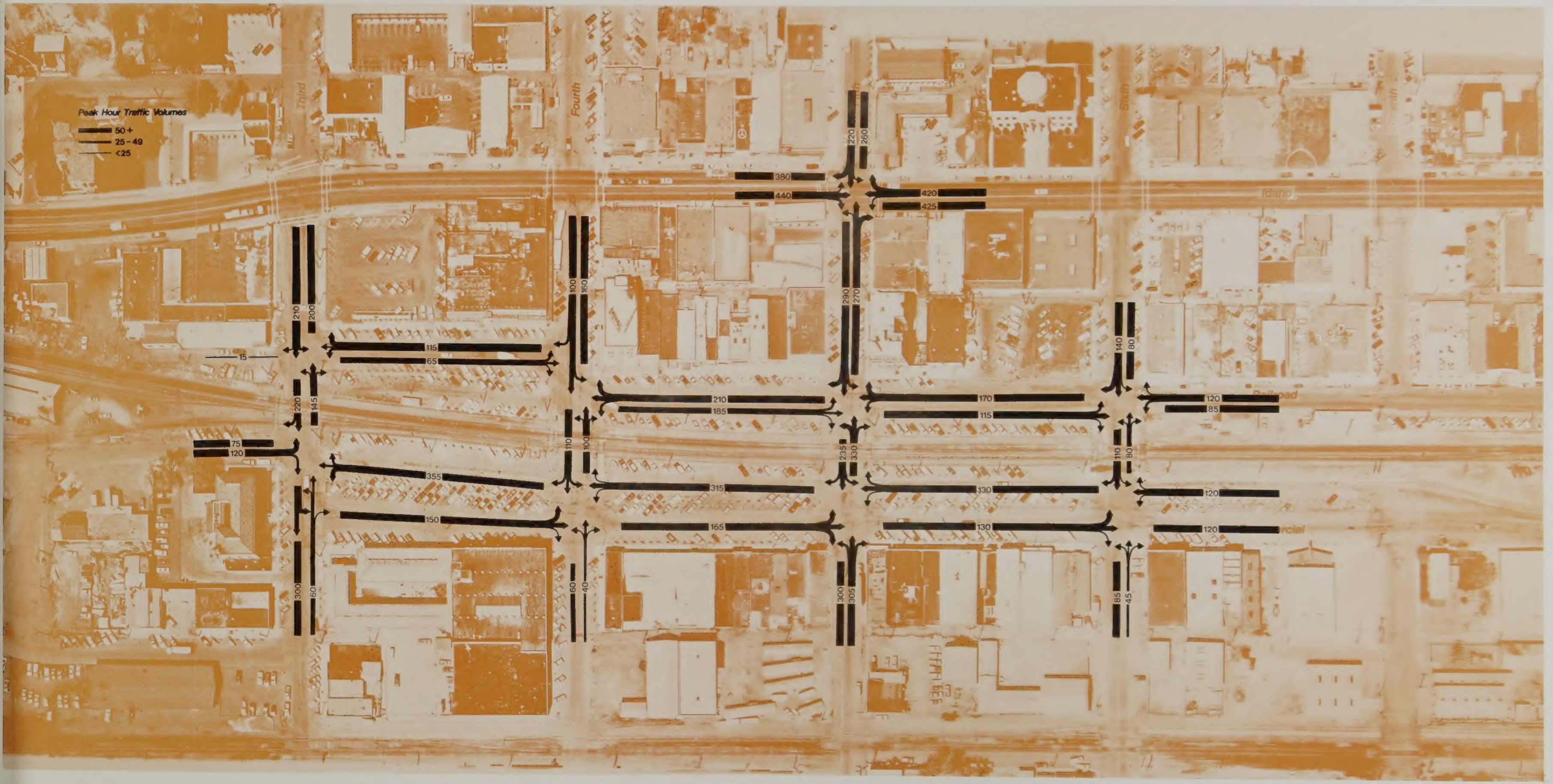
Exhibit 22-8 shows existing peak-hour traffic and turning movement volumes in the downtown area. Two-directional peak-hour volumes on the order of 200-400 are well below street and intersection capacity. However, the unconstrained pattern of traffic and pedestrian movements coupled with the presence of unprotected rail crossings pose a significant safety hazard to residents and tourists. Numerous left turn conflicts occur along Third and Fourth Streets because the present street configuration features five traffic intersections in the short block from Railroad to Commercial Street. A driver proceeding from one row of parking to another searching for a parking space must make a U-turn across Third or Fourth Street traffic. Numerous U-turns (turning short toward oncoming traffic), and diagonal movements across Fourth Street can be observed. Meanwhile, drivers and passengers of cars using the parking area between Railroad and Commercial randomly cross one or more streets and rows of parked cars to reach business establishments. With a virtually unlimited array of vehicular and pedestrian movements, together with the unprotected rail crossings, the driver, pedestrian and train engineer must constantly be alert. Such traffic conditions have encouraged a high degree of risk taking -- drivers attempting to beat the train; pedestrians stepping into streets daring vehicles to stop; drivers executing fast illegal maneuvers before oncoming vehicles.

Exhibit 22-9 illustrates mid-afternoon pedestrian movements along sidewalks to and from major attractions. Three traffic generators appear dominant -- the Stockmens, the Commercial Hotel, and the Mayfair Market. The principal pedestrian flow in the downtown area is bisected by the Southern Pacific tracks.

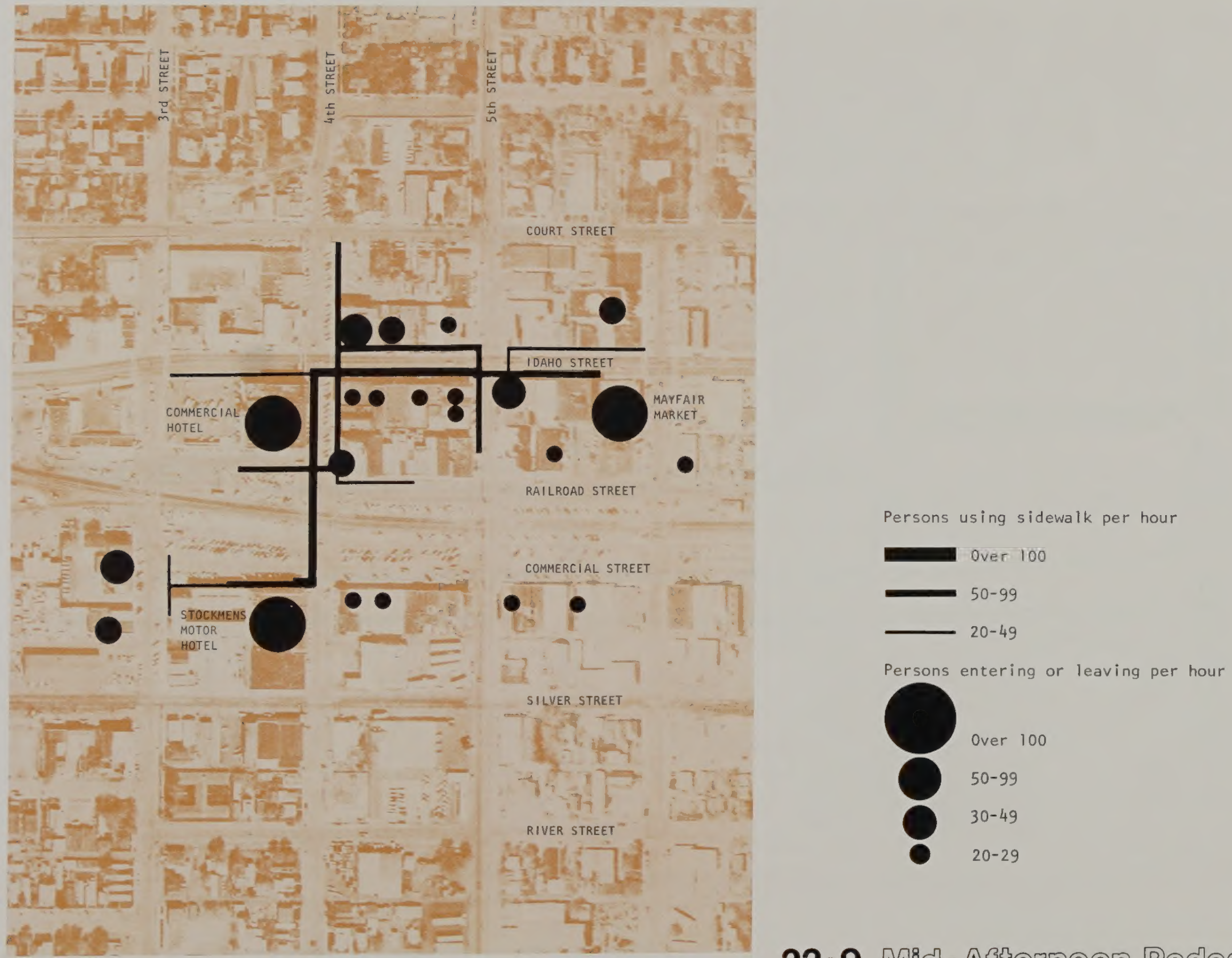
Present parking supply and typical use during morning, afternoon and evening hours is shown in Exhibit 22-10 and Table 22-11. Highest utilization (50-70 percent) occurs in the afternoon in most parking areas. Merchants have expressed their concern on numerous occasions for inadequate parking. The survey of CBD parking indicates the present parking problem is principally one of poor distribution of spaces rather than inadequate total supply, i.e., there is not always an available space in front of each business establishment. The present parking configuration between Railroad and Commercial Streets -- parking rows paralleling business frontage, parking area bisected by railroad tracks and chain link fence -- presents barriers to driver and pedestrian in getting to and from remote spaces. Hence, spaces directly in front of businesses are heavily used but spaces in the center of the parking area are underutilized.

IMPACTS ON CBD CIRCULATION AND PARKING

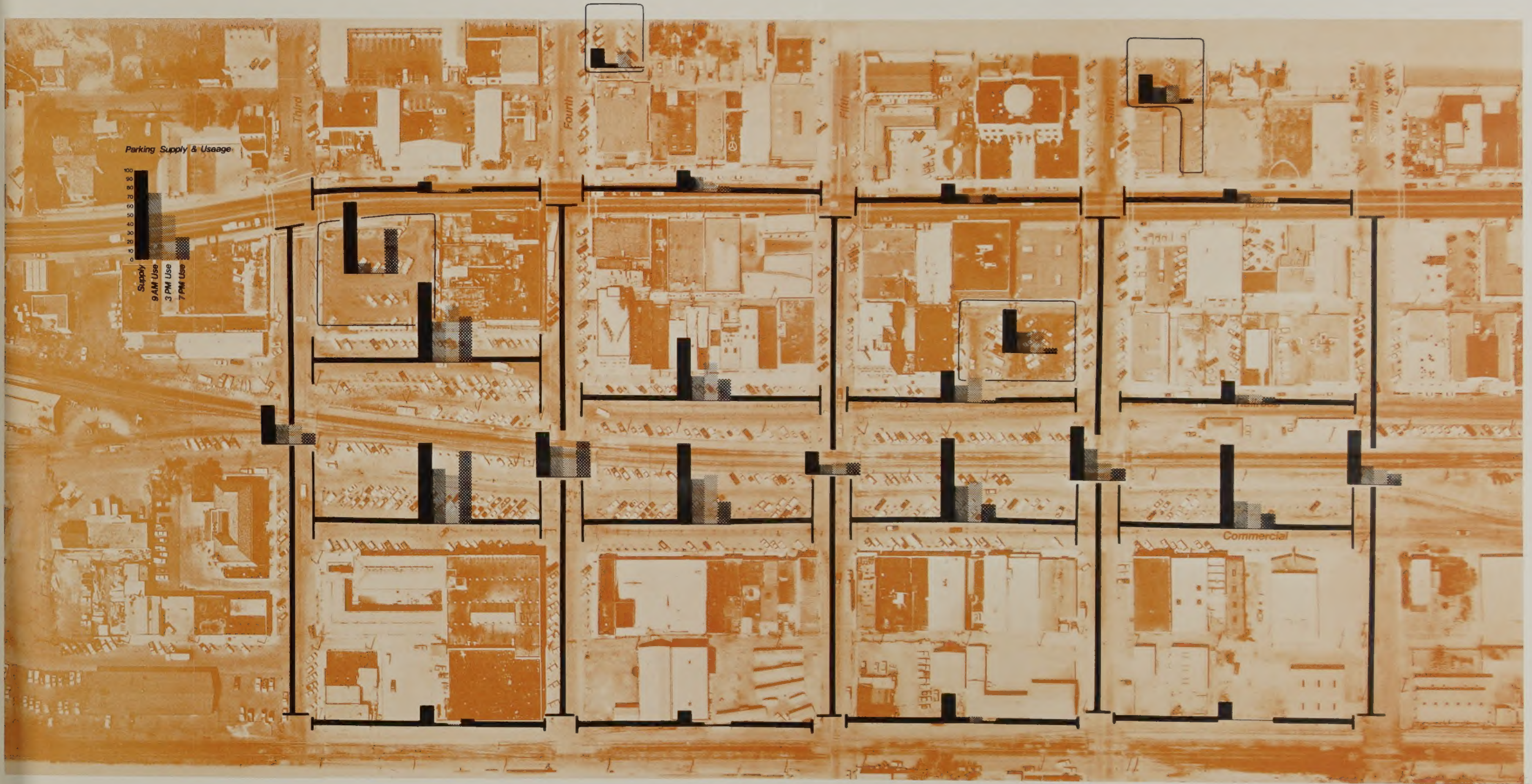
- Removal of the railroad tracks from between Commercial and Railroad Streets will permit reorientation of the parking/circulation configuration which in turn should reduce vehicular and pedestrian accident



22 · 8 Peak Hour Traffic and Turning Movements in Downtown Area



22·9 Mid-Afternoon Pedestrian Movement



22 · 10 Parking Supply in Downtown Area

exposure by 50 percent or more.

- By orienting parking rows north-south so as to feed into Railroad and Commercial Streets, the number of intersections along Third, Fourth and Fifth Street would be reduced. This also would allow persons to get from parked cars to businesses without crossing rows of parked cars.

- Removing the railroad and reorienting the parking configuration should encourage north-south pedestrian movements to Railroad and Commercial Street businesses, while concurrently increasing visibility as a safety-factor for pedestrians.

Table 22-11

PARKING UTILIZATION IN ELKO CBD

	On-Street Parking			Off-Street Parking		
	Spaces	Spaces Occupied	Percent Occupied	Spaces	Spaces Occupied	Percent Occupied
CBD*						
9 AM	967	454	47	249	72	29
3 PM		464	48		98	39
7 PM		353	37		82	33
Maximum		545	56		132	53
Casino Area**						
9 AM	369	213	57	148	26	18
3 PM		246	67		36	24
7 PM		221	60		70	47
Maximum		280	76		70	47

*Area bounded by and including Third, Idaho, Seventh and Silver Streets.

**Area bounded by and including Third, Railroad, Fifth and Commercial.

Source: Chilton Engineering Survey, 9:00 AM - 7:30 PM, July 30, 1974.

- Reorientation of parking spaces into north-south rows should increase the perceived availability of parking stalls so as to obtain greater utilization.

- Removal of the railroad tracks will also make available land on which additional parking spaces can be built. A 20-30 percent increase in parking should be possible from parking reorientation and railroad relocation.

IMPACTS ON THE TRANSPORTATION ELEMENT OF THE ELKO GENERAL PLAN

The following transportation proposals contained in the Elko General Plan are impacted by various railroad track relocation alternatives:

- Consolidate and relocate railroad tracks to the north bank of the Humboldt River and provide full grade separation with crossing arterial streets.

- Retain river crossings in the vicinity of Fifth, Eighth and Ninth Streets.

- Provide future river crossings, (a) east of town at Civic Center Drive extended to connect U.S. 40 with Lamoille Road, and (b) west of town at Route 51 extended to connect with Bullion Road at the Hot Hole.

- Extend Front Street west to the vicinity of the Hot Hole and east to the proposed Civic Center Drive extension and river crossing. The arterial street would parallel and relieve congestion on Bullion/Lamoille Roads.

- Extend Silver Street east to the proposed Civic Center Drive extension and river crossing and west to the proposed Route 51 extension and Hot Hole river crossing. Silver Street would parallel and relieve congestion on Idaho Street.

- Provide one-way circulation within the downtown on Railroad/Commercial Streets.

- Provide circulation around the downtown via Third, Silver, Eighth and Court Streets.

Table 22-12 compares the compatibility of the Silver Street, North Bank, South Bank and "No Project" alternatives with these General Plan transportation objectives. The comparison necessarily contains a bias toward the North Bank alternative contained in the General Plan. However, the comparison also shows better compatibility overall for the South Bank and "No Project" alternatives than for the Silver Street plan.

Table 22-12

COMPATIBILITY OF RAILROAD RELOCATION WITH ELKO GENERAL PLAN TRANSPORTATION OBJECTIVES

Objective	Silver Street	North Bank	South Bank	No Project
Railroad Relocation To North Bank	Not Compatible	Compatible	Not Compatible	Not Compatible
River Crossings at Fifth and Eighth/Ninth	Most Disruption	Some Disruption	Some Disruption	Least Disruption
Future Crossing at Civic Center Drive Extension and Hot Hole *	Compatible	Compatible	Compatible	Requires Two Structures At Each Crossing
Front Street Extension	Compatible	Less Than Optimum Intersection Geometrics	Overpass Renders Arterial Useless	Compatible
Silver Street Improvement and Extension -- East of Third Street	Overpass Renders Silver Street as a Collector Useless	Compatible	Compatible	Narrow Right-Of-Way
One-Way Traffic on Railroad & Commercial Streets	Overpass Severs Street System	Compatible	Compatible	Compatible
Third-Silver-Eighth-Court Loop Around Downtown	Not Compatible	Compatible	Compatible	Narrow Silver Street Roadway

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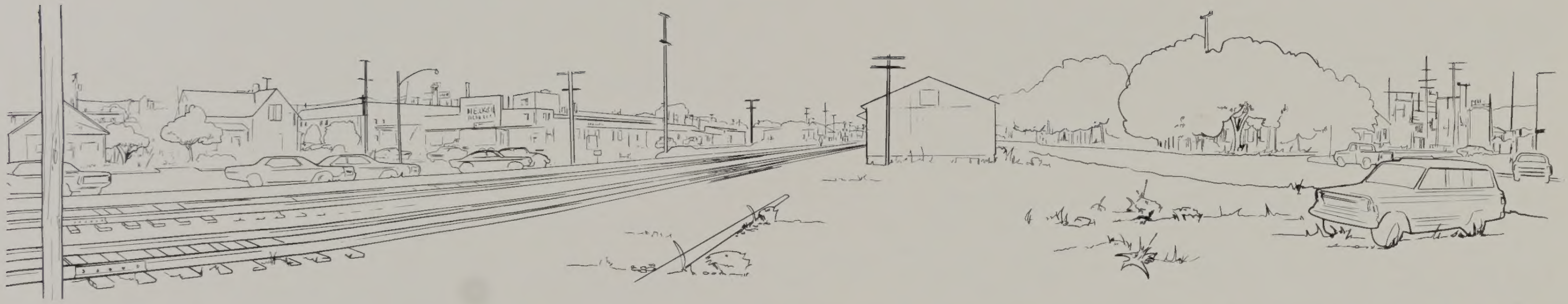
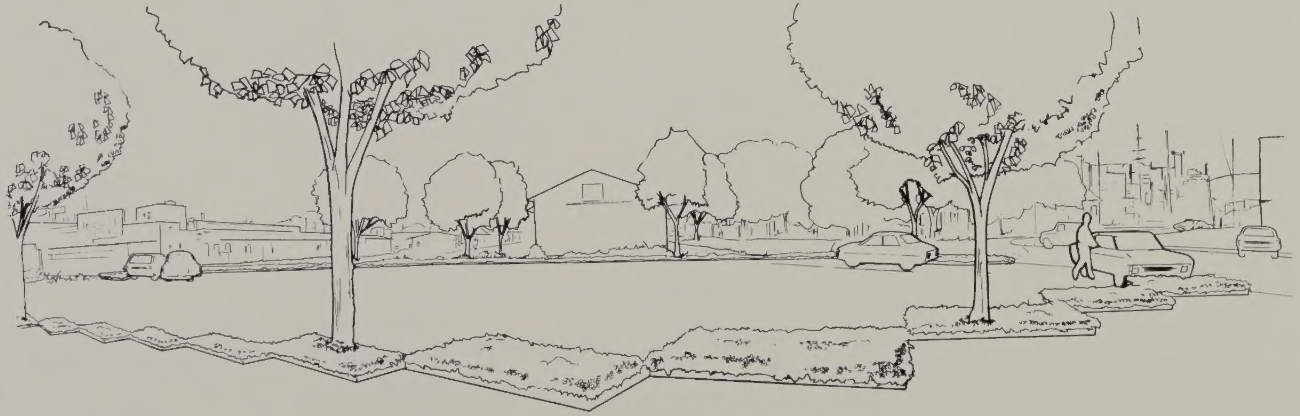
*Easterly extension of Silver Street to Hot Hole crossing not physically possible unless railyard is abandoned or moved east of Elko.



EXISTING VIEW OF THE RAILROAD COMMERCIAL STREET CORRIDOR LOOKING EAST FROM SEVENTH STREET



VIEW FROM THE SAME LOCATION SHOWING REALIGNMENT OF PARKING AND RETENTION OF EXISTING WAREHOUSE FOR COMMERCIAL RETAIL USES

Section 23

Schools and Emergency Services

January, 1972 - Elko Police car
Fifth Street at the Southern Pacific tracks
(Elko Daily Free Press)

INTRODUCTION

The reliability of basic city emergency services in Elko is seriously jeopardized by the existing location of the railroad, which divides the City into two parts. With response time being the crucial factor determining the effectiveness of police, fire, and ambulance services, delays caused by train crossings have been responsible for a number of accidents and incidents involving property damage and personal injury.

School children are also potential victims of this "split community," a significant number of children being forced to cross the tracks daily to make the trip between home and school. The magnitude of the problem, however, only becomes apparent when it is realized that in the past, trains have blocked the entire north-south street circulation system of the City.

It is not uncommon for a single long freight train to block the entire downtown area for periods of five to seven minutes. Accidents involving malfunctions of signal systems, motive power or rolling stock -- such as broken brake hoses, frozen brake lines in periods of extremely cold weather, or engine failures -- have obstructed the north-south streets for periods of 40 minutes or more.

Such delays are clearly unacceptable if public emergency services are to be available with any reasonable degree of reliability.

To gain a clearer understanding of the problems presented by the existing track location, each of these basic City services is examined in detail below.

Schools

Within the City there are presently four schools, three north of the tracks and one south of the tracks. The three schools north of the tracks are: The Elko Junior and Senior High School, located at College and Ninth Streets, three blocks north of the S.P. tracks; Elementary School #2 at Ash and Sixth Street, six blocks north of the S.P. tracks; and the Northside Elementary School on the northwest edge of town. The only school south of the tracks is the Southside Elementary School, some six blocks from the Silver Street W.P. tracks. The enrollment at each school is shown in Table 23-1.

The present boundary of the elementary school district service area is Railroad Street, just north of the S.P. tracks. Elementary students who reside south of Railroad Street attend the Southside School. Students living north of Railroad Street attend the No. 2 Elementary School. According to the Elko School District, approximately 50-60 students must walk across the tracks daily to attend the Southside Elementary School.

According to information from the Elko County School District, approximately 40 percent of the students in any one grade of the total school district's

Table 23-1

SCHOOL ENROLLMENT ELKO SCHOOL DISTRICT

School	Student Enrollment	
Elementary School #2	407	(1972)
Northside Elementary School	411	(1972)
Southside Elementary School	526	(1973)
Junior-Senior High School	1,204	(1972)

enrollment, come from the area south of Railroad Street, i.e. south of the tracks. This means that approximately 500 students attending the Junior and Senior High School must cross the tracks to get to school. Approximately 25 percent of these students drive to school, some walk, others are bussed.

During the normal school day there are an average of 34 crossings by school buses over both sets of tracks. Although there is no recorded incident of an accident between a school bus and a train there is a serious potential for such an accident with so many daily bus crossings.

In addition to the safety factor there is also the problem of frequent delays which the daily regular and lunch bus schedules experience due to the trains.

The safety factor is even more important for children walking to school. Although there are no known recent incidents of children being injured by trains while walking to school, the potential danger is serious, as youngsters have been observed crawling under or between the cars of a stopped freight train when several crossings have been blocked.

Police Protection

The present railroad situation poses significant problems in providing the maximum efficiency in police services by the City, State and Sheriff police departments, particularly the City of Elko Police Department.

The City Police Department is housed north of all the railroad tracks at the corner of Seventh Street and Railroad Street. The presence of the railroad tracks results in delays in police response time, and therefore a reduction of possible police protection efficiency. It also affects how the City conducts its police operations.

The Elko Chief of Police, in a letter dated June 10, 1974, states, "Delay in response time is a continuous problem due to trains and many times, after the police unit has cleared one set of tracks it is again delayed by a train on the second set of tracks. The calls for police service range from serious situations, that require immediate attention, to routine complaints -- I can recall twice over the past years where a vehicle was knocked to the south side of the tracks and the police units on patrol were on the north side of the tracks at the time. This required that they had to go west on Highway 40 to the Hot Springs Road to cross and then return to the accident scene. This has also happened many other times where it did not involve an accident."

Because of the railroad situation the Police Department attempts to ensure there is one patrol unit south of the tracks most of the time. Usually there are three police units on patrol, one south of the tracks, one in the downtown area, and one north of the tracks. However, situations arise that require all three units at one location. Then if there is another police call on the other side of the railroads the police again face potential delay in response time.

It is impossible to calculate precisely the potential improvement (and economic benefit) attributable to more rapid police response if the railroads are relocated. However, it is important to note that the Elko Chief of Police states that delay in police response time due to the railroad tracks is a daily occurrence. Consolidation of the tracks and provision of overpasses or underpasses would "greatly increase the efficiency of the patrol as well as make the patrol much more effective in response to emergency situations," and would also be a great improvement in public safety with the elimination of railroad crossing accidents.

Fire Protection

The City of Elko maintains two fire stations. The headquarters station is 100 feet north of the Southern Pacific tracks on Railroad Street between Seventh and Eighth Streets. A second station was constructed south of the tracks on Tenth Street in 1970 because of the problem of the railroads blocking the crossings. This second station involved a construction cost of $40,000, a new replacement piece of fire fighting equipment valued at $32,000 and the hiring of three additional shifts of regular firemen at an annual cost of $24,000. Despite this considerable cost to the taxpayers, fire protection south of the tracks is still limited to one piece of equipment whenever a train blocks the grade crossings.

The headquarters station houses Elko's biggest pumper, the only 55 foot Aerial Platform and the only medium Rescue Rig. The main station is also the location of the alarm system to the area's hospital and nursing home, and other high value and high safety areas.

As stated by the Elko Fire Chief, the present situation poses a number of problems with regard to fire protection:

- The most obvious problem is the problem of delay of equipment from the main fire station responding to a call south of the tracks. At least one instance has been recorded of a train delaying a fire engine enroute to a fire, thereby preventing the rescue of a child whose life depended on timely response. The main fire station not only provides back-up protection for the Tenth Street station, it sometimes can be the only immediately operational station. A man is assigned to the southside for each of three daily shifts, but if one of these men is ill or on vacation there is no one to replace him. The Fire Chief is particularly concerned about the Southside Elementary School. If a train were to delay fire engines responding to a call at the school, the result could be very tragic.

- Delays have also been experienced by the Nevada Division of Forestry in reaching rural fires. The Division of Forestry serves a wide area south of the tracks and provides protection against brush fires, endangered ranches, livestock, wildlife and recreation areas.

- Another problem is the potential for collision between trains and fire fighting equipment. Several years ago, a fire truck enroute to a call was hit by a train and damaged at a crossing. Twice in 1974, Elko firemen have had to risk crossing the tracks in front of an on-coming train. In a letter dated September 5, 1974, the Elko Fire Chief illustrates the problem with what could have been a potentially tragic situation. In August 1974 a fire engine from the headquarters station had to cross the tracks only two blocks in front of an on-coming freight train to respond to a fire in a trailer home. While this was a dangerous thing to do, the firemen had to gamble to ensure the safety of the occupants of the home. Under less fortunate circumstances loss of life would have been most probable. In the second incident a fire engine and ten firemen were delayed for over 6 minutes. The lack of a second fire engine and sufficient manpower resulted in heavier insurance losses on a commercial property.

- Finally, there is the real fire hazard posed by the trains themselves as they pass through the heart of Elko. The potential for a serious railroad-caused fire is ever present. The Elko Fire Chief has expressed concern, for example, about liquified petroleum gas trains and cars in and around the City. On hot days LPG tankers park next to lumber yards to vent, and prevailing winds could cause explosive gas vapors to spread across the track area. In addition, there are the dangers posed by possible derailments. Several U.S. cities have experienced accidents caused by derailment of trains carrying highly explosive materials. Relocation of the tracks would help reduce the cited hazards and would also provide increased protection for the local fire department headquarters by having the railroads further away from the main fire station.

Ambulance Service

The Elko General Hospital has two ambulances stationed at the hospital at 12th Street and College Avenue, north of the railroad tracks. In addition to serving the city, the ambulances serve an extensive area of northeastern Nevada, including up to 30 miles south of the City and south of the railroad barrier. The service is staffed by a full time director. Off-duty firemen serve as volunteer ambulance drivers.

According to the Director of the Ambulance Service, the location of the railroads poses a number of problems for the ambulance service. The ambulance answers an average of 25 calls per month, of which some 75 percent are south of both railroad tracks. This results in delays for the ambulances, for some volunteer drivers in reaching the ambulances, and for back-up volunteers arriving at the scene to assist the ambulance driver. In 1973 delays to the ambulance itself occurred five times in the year, while another five delays were due to personnel being delayed. The longest delay in 1973 was about six minutes. In 1972, the ambulance was delayed by trains on six separate occasions. On one of these runs, the patient suffered a heart attack and died shortly after reaching the hospital.

In view of the present railroad barrier, the Elko City Plan recommends that, if the railroads are not relocated, an ambulance be stationed south of the tracks. Then, in emergencies, the ambulance need cross the tracks only once en route to the Hospital.

Impacts

- Any of the project alternatives for consolidating and relocating the railroad tracks will result in a substantial improvement in public safety for the Elko area, particularly the southern part of Elko and communities south of Elko. The beneficial impacts include:

a. improved police and fire protection
b. improved ambulance service
c. removal of a serious hazard to school buses, and to school children who daily walk across the tracks
d. reduction of the potential for derailment and railroad-caused fires in the center of the city, especially with the north or south bank alternatives

- A "no project" alternative will, of course, result in continuation of the present problems previously outlined, with the continued serious potential for loss of life and property.

- The north and south bank alternatives are slightly better than the Silver Street alternative for providing quick response to emergency situations. There are several reasons for this. The north and south bank alternatives are less disruptive to the central area between Railroad and Commercial streets and they would allow Silver Street to function as a local street without main line railroad traffic. By allowing better traffic circulation they would permit quicker response by emergency vehicles. Another disadvantage of the Silver Street alternative with overpasses affects both the response time of police and fire vehicles and is particularly serious for fire protection. If a train is blocking the proposed gated crossings on Silver Street, the only way for fire and emergency vehicles to reach the other side of the tracks is via Idaho Street and then on to the Fifth and Eigth Street overpasses. As presently designed, the only way for the fire engine at the second fire station to get to the south side of the river would be via a circuitous route over the Fifth Street bridge.

- A Twelfth Street crossing versus an Eighth Street crossing offers some benefits for emergency vehicles and schools. Advantages of a Twelfth Street crossing include:

  It would reduce some of the present and, more importantly, future heavy traffic in front of the Southside Elementary School, thereby reducing the potential for traffic accidents involving school children.

  It would avoid more of the present unnecessary through traffic in the Central Business District,and would offer slightly better direct access to the hospital and junior and senior high schools for some residents of southeast Elko and communities south of Elko along State Route 46 and Lamoille Road.

- With regard to the Southside Elementary School, the Principal believes that a north bank alignment would be more beneficial to the school than a south bank alignment, for the following reasons: (1) it would relocate the railroad tracks closer to the Southside School; (2) with the south bank alignment, the overpass necessary to span the tracks and the river would have its starting point much closer to the school; and (3) it has the possibility of splitting the town a little more rather than bringing it closer together.*

- The School District Superintendent indicated a further disadvantage of the south bank alignment for the Southside School. With adequate overpasses, the south bank alignment would preclude southside residents from using Front Street as an access to Fifth and Ninth and they would find it necessary to come to Wilson Street which could greatly increase the amount of traffic at the school.

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*Letter of June 6th, 1974 from the Principal of the Southside Elementary School

Section 24

Utilities

UNDERGROUND LINES

The City of Elko has the usual municipal underground utility distribution systems for domestic water and gas; has a complete sanitary sewer collection network; and storm drains on selected streets.

Relocation of existing distribution lines is not expected to cause any unusual problems, although some major lines will require special attention under certain of the relocation plans.

SANITARY SEWER

The main sanitary interceptor from the residential areas south of the river to the north follows Sixth Street. A pumping station which discharges into a sanitary force main is located on the north bank of the river at Sixth Street. The depth of the sewer and the location of the pumping station were established so that they would not need to be dislocated under any of the three track consolidation plans discussed in this report. Some encasement of underground pipe, however, may be required.

TELEPHONE

Underground cables of the local telephone company also follow Sixth Street. The telephone company recently lowered these cables to a depth that would not require subsequent relocation under any of the track relocation plans.

ELECTRICAL TRANSMISSION

The main electrical power transmission line enters Elko from the southeast, intercepting the WP right-of-way at Thirteenth Street. The relocation of certain poles, and the raising of sections of the line to provide adequate vertical clearances over the railroads, may prove necessary, depending upon the particular track relocation plan selected and its precise alignment.

ELECTRICAL ENERGY CONSUMPTION

The present Elko flat yard usage of electrical energy from the local utility company is estimated at less than one percent of overall community electrical energy demand. The estimated monthly increase in electrical energy consumption at the new yard is expected to be nominal. Any increase will be attributed to an expected larger area to be lighted for night classification, inspection, and locomotive servicing operations.

WATER

With regard to the North or South Bank Alignments, channelization of the river will almost certainly impact the major water line serving the south side of Elko via Second Street.

SUMMARY

Of the three specific alternative relocation plans discussed in detail in this report, all involve utility relocations of about the same magnitude and difficulty, and the cost thereof is expected to be relatively insignificant in relation to the total cost of the project. The problems involving utility relocation do not influence the choice of alignment.

However, it should be pointed out that with regard to the track depression plan, discussed in Section 7, the depressed trainway would cut all north-south sewer, water, gas and storm drainage lines and necessitate major rearrangements of these services.

Section 25

Visual and Aesthetic Qualities

This section considers the impact of railroad relocation construction, completed facilities, and train operations on the visual character of Elko. A brief overview is given on the concept of visual impact and a framework for its evaluation. This is followed by identification of existing visual resources within the project area, the positive and negative effects of the proposed construction, and an evaluation of proposed mitigation measures.

EVALUATION CRITERIA

Visual impact is a complex phenomenon determined in part by physical changes taking place, the location of the observer, and the nature of the view but influenced greatly by people's previous experiences, attitudes, values, and expectations. Of principal importance in assessing visual impact are the following:

1. The structure of a visual scene. A view's structure is defined by the number of images or objects contained within the sphere of vision. When these images are complex with forms, colors, and contrasts evenly distributed, and there is a lack of a distinct focal point, the scene often elicits conflicting responses from the viewer.

   With complex views, the effort necessary to respond to each image is so great that often no response is made. This phenomenon is the common reaction to urban visual stimuli. With such views there is a tendency to "not see." There is awareness of the view but limited messages are received and little response made.

   On the other hand when fewer images are contained within a view, the opportunity for response by the viewer is much greater. These are the views that are remembered: a beautiful building, a scene of the mountains, a silhouetted tree. These views contain only one or two dominant images. Visual and aesthetic qualities can be strengthened in an urban design plan by reducing the number and complexity of visual images apparent from any location.

2. The number of people viewing a change and the frequency and duration of this exposure. Visual and aesthetic consideration should be emphasized in settings with the greatest human exposure.

3. The magnitude of the change proposed. The effects on visual and aesthetic quality from a proposed design plan will be in proportion to the scale of the physical change proposed.

4. The contrast between the scale and appearance of the proposed project and the perceived compatibility with the character of adjacent property and uses.

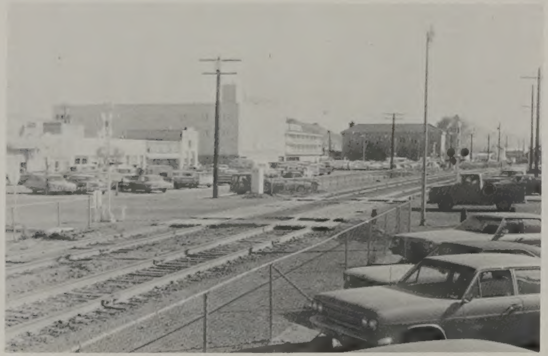
5. Public respect for or attachment to natural or man-made features being dispersed or altered.

6. Public attitudes and expectations regarding changes forthcoming from the project, e.g., do individuals viewing change stand to benefit from it or are they merely inconvenienced?

The following analysis emphasizes how physical changes might be perceived from the visual standpoint by project neighbors and the traveling public. The sketches show existing conditions together with how the area would appear with each of the alternative proposals. A brief description is included with each sketch describing the effect of the proposed action on visual and aesthetic qualities.

Commercial Street Corridor

The Railroad/Commercial Street corridor can be characterized as a 300 foot wide open mall space stretching for one mile through the heart of Elko from Third Street to Eleventh Street. The mall is lined with one to four story commercial structures between Third and Seventh Streets and one and two story residences from Seventh to Eleventh Streets. The railroad tracks, chain link fencing, signal poles and utility wires run along the center of the open mall. At both ends of the 300 foot-wide corridor, industrial structures converge to within 50 feet of the track, terminating the open mall effect present through the center of town. That segment of the open mall from Third to Fifth Streets is undoubtedly the most frequently viewed, most remembered, and hence, most significant urban design feature in Elko. The mall is flanked on the north and south by an uninterrupted series of store fronts. The round windowed tile roofed Post Office building provides a handsome west terminus to the mall. There is no east end to the mall when viewed from downtown. Provision of an east terminus by placing a structure in the center of the mall two to three blocks from the Post Office would give the mall more definition in the downtown area. Similarly, the historic Central Pacific warehouse or other structures in the center of the mall near Eighth or Ninth Streets would provide definition of subsections of the mall.

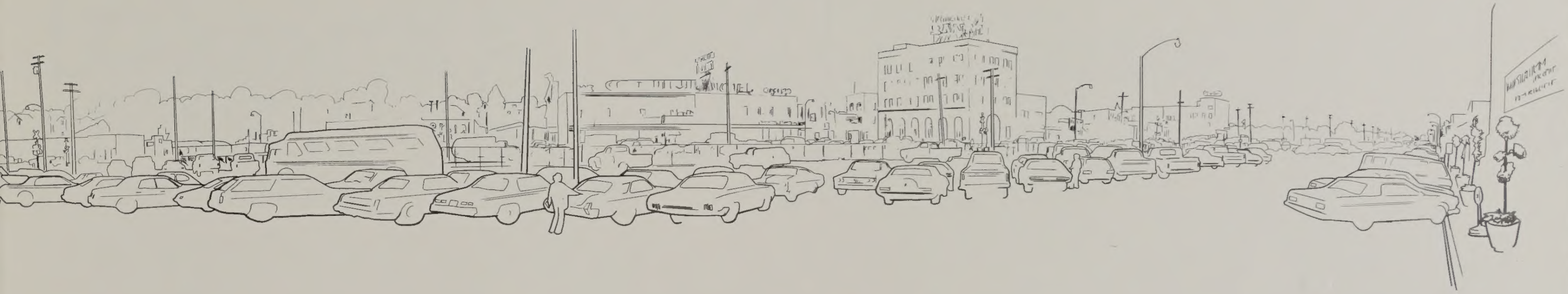


The Alternative concepts suggested for the Railroad-Commercial Street corridor will introduce trees to break up the long visual space from Third to Eleventh Street (see Exhibit 25-1). Parking will be redirected in sixty foot corridors across the mall instead of extending along its length. Tree masses will redirect views to commercial establishments on either side of the mall, provide shade in the summer, and reduce the apparent size of the corridor area. Visually, the corridor will be divided into many small vistas of shade trees, nearby stores, hotels, casinos, and areas within the corridor itself.

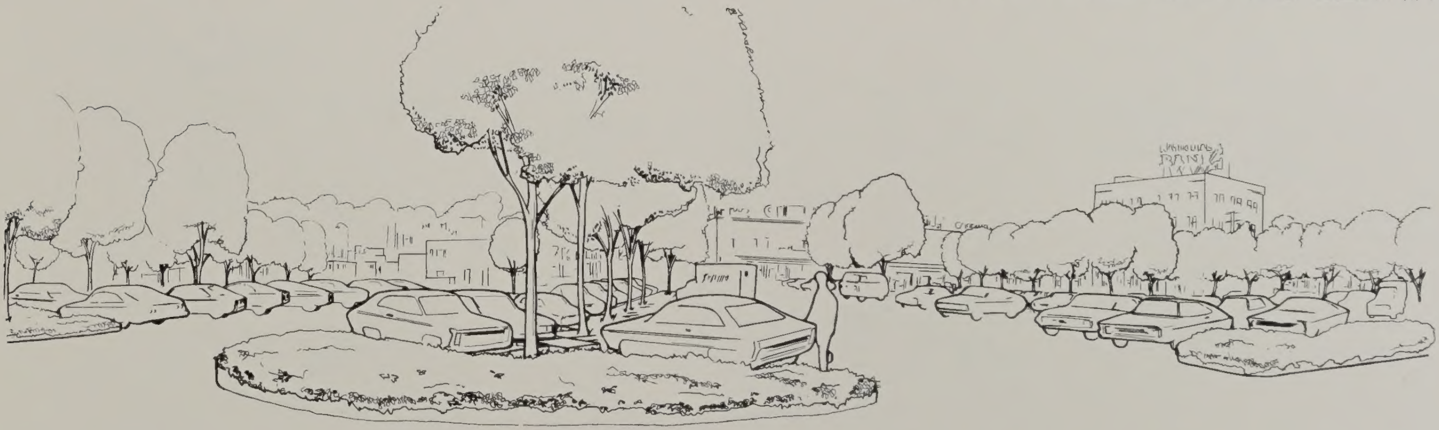
Riverbank

The visual character of the Humboldt River and floodplain is one of open land with willows, low grasses, and sages. It is predominantly undeveloped. To the west of First Street, a quarrying operation has left open pits which are now filled with ground water. Two bridges presently cross the river at Fifth Street and Ninth Street. After a disastrous flood in the early 1940's, a dike was built along the Humboldt to protect adjacent residential areas. The dike blocks their view of the river for most nearby residences.

The natural open space linkage now provided by the flood plain will be reenforced by the proposed alternatives for the railroad corridor (see Exhibit 25-2). With the acquisition of additional land, the river park and lake can provide a strong visual element within Elko. By eliminating an existing wrecking yard near the Fifth Street bridge and the introduction of the plantings, walkways, and other park facilities, the floodplain can become a dominant visual linkage and recreation area easily accessible from both north and south portions of the City.

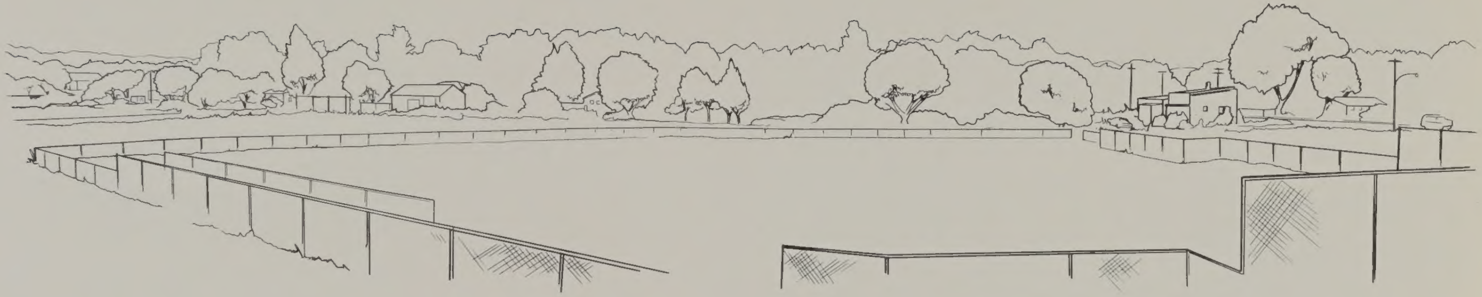


EXISTING VIEW OF RAILROAD COMMERCIAL STREET CORRIDOR IN FRONT OF THE STOCKMAN'S HOTEL

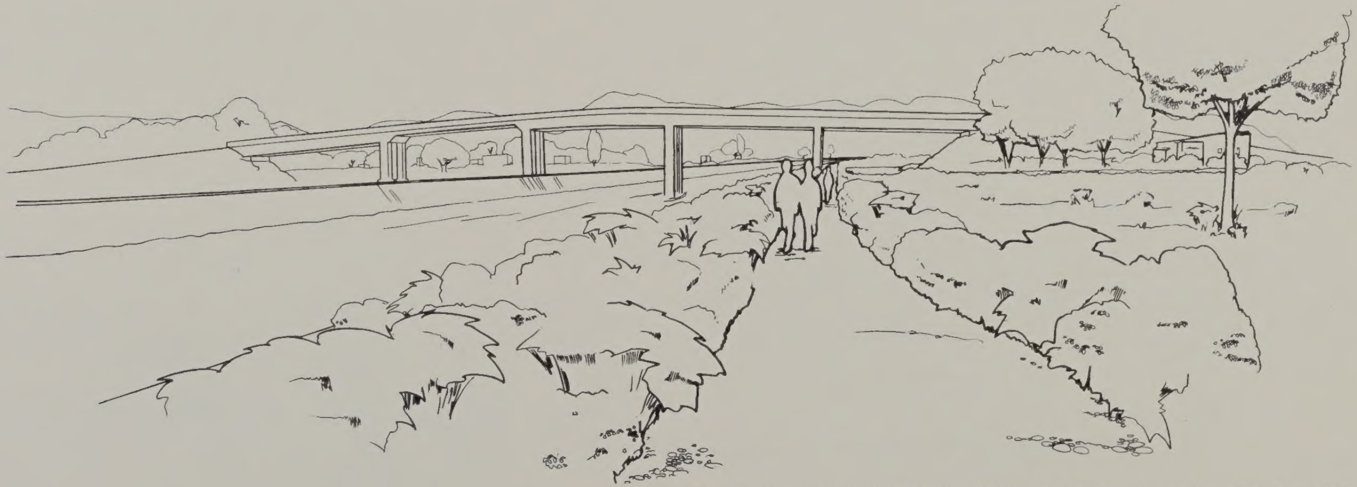


VIEW FROM THE SAME LOCATION SHOWING THE REALIGNMENT OF PARKING IN A POTENTIAL DESIGN PLAN.

25 · 1 Railroad · Commercial Street



EXISTING VIEW OF SOUTH SIDE PARK



VIEW FROM THE SAME LOCATION SHOWING THE PROPOSED EIGHTH STREET BRIDGE AND LINEAR PARK AS IT WOULD APPEAR IN THE NORTH BANK ALTERNATIVE.

Part VI

Summary of Impacts

SECTION 26. ALTERNATIVE ALIGNMENT IMPACTS

SECTION 27. YARD RELOCATION TO THE EAST OF ELKO - IMPACTS

Section 26

Alternative Alignment Impacts

INTRODUCTION

Throughout the report, impacts of the project alternatives and conceptual plans have been presented. In order to present the beneficial and adverse consequences of the many alternatives, the following matrices have been prepared.

These summary matrices outline the unavoidable impacts, such as water and air pollution, damage to life systems and resource commitments, as well as relationships between the local short-term uses and the long-term gains or losses resulting from the project.

The matrices include the following summaries for comparison:

- Beneficial Impacts.
- Adverse Impacts.
- Irreversible Commitment of Resources.
- Short-term Use vs. Long-term Productivity.
- Mitigation Measures Proposed.

Beneficial

	TOPOGRAPHY & SOILS	WATER RESOURCES	AIR QUALITY	NOISE	VIBRATION	VEGETATION	WILDLIFE
SILVER STREET	• No significant benefits	• No significant benefits	• Increased combustion efficiency of locomotives • Reduce "waiting" automobile emissions during street blockage from trains	• Welded track reduce noise level ("clickety-clack") • Noise reduction from eliminating horn blowing is greater than amplification from speed increase • 54 dwelling units freed from excess of 65 L_{dn} noise exposure • 52 businesses freed from excess of 75 L_{dn} noise exposure • No additional businesses affected	• Welded rail eliminates vibration caused by railcars bouncing over bolt-jointed tracks • Elimination of low speed limits in town removes need for acceleration, a major source of low-frequency vibration • Fewer residences lie within critical 200 feet from tracks. (Other land uses are less sensitive.)	• Existing vegetation will continue to develop without disturbance	• Terrestrial and aquatic habitats will not be disrupted
NORTH BANK	• 111,000 cu. yds. of fill to improve flood plane area for recreation uses	• Channelization will materially reduce flood flows • Improving 5th Street bridge will lower backwater levels during floods	• Same as above	• Welded track reduces noise levels ("clickety-clack") • Noise reduction from eliminating horn blowing is greater than amplification from speed increase • 199 dwelling units freed from excess of 65 L_{dn} noise exposure • 74 businesses freed from excess of 75 L_{dn} noise exposure • No additional businesses will be adversely exposed	• Same as above	• Present undeveloped or barren land would be landscaped for parks	• Fish production would be improved in an off-channel lake with some areas 10-15' deep • Improved aquatic habitat in re-channeled sections by using large rocks and plantings to provide shaded habitats
SOUTH BANK	• Same as above	• Same as above	• Same as above	• Welded track reduces noise levels ("clickety-clack") • Noise reduction from eliminating horn blowing is greater than amplification from speed increase • 225 dwelling units freed from excess of 65 L_{dn} noise exposure • 68 businesses freed from excess of 75 L_{dn} noise exposure • No additional businesses will be adversly exposed	• Same as above	• Same as above	• Same as above
NO PROJECT	• No significant benefits	• No significant benefits	• No significant benefits	• No significant benefits	• No significant benefits	• Existing vegetation will continue to develop without disturbance	• Terrestrial and aquatic habitats will not be disrupted

HISTORIC SITES	ARCHAEOLOGY	POPULATION	LAND USE & DISPLACEMENT	TRANSPORTATION	SCHOOLS AND EMERGENCY	UTILITIES	VISUAL QUALITY
• Placing appropriate markers or plaques commerating areas of historic significance	• No significant benefits	• Construction will result in providing an average of 100 new jobs • Expanded railroad yard to bring 5-10 new jobs	• Potential development of commercial-Railroad Street corridor • Possible industrial redevelopment of block south of Silver Street	• Overpasses reduce travel delay and accident hazards • Grade separation increases RR efficiency • Provides replacement of existing 9th Street bridge • Should encourage north-south pedestrian movement in new mall design • Increase preceived parking availability and allow 20-30% increase in parking	• Improved fire and police protection • Improved ambulance service • Removal of serious hazard to school busses	• Eliminated overhead lines in City Center	• Allows for the redevelopment of the Commercial-Railroad Street corridor into a pleasing urban space
• Same as above	• No significant benefits	• Same as above	• Same as above • Upgrading of housing quality/elimination of blight on north bank of river	• Same as above • Allows more efficient traffic circulation • Developes segments of city street system necessary for future growth • Most consistent with general plan transportation objectives	• 12th Street alternative substantially reduces traffic next to South Side Elementary School • Better than Silver Street alternative for providing quick response to emergency services • Eliminates pedestrian movement on tracks which protect school children en route to and from classes	• Same as above	• Same as above • Eliminated unsightly areas along Humbolt River • Encourages the development of a park and recreation lake along the Humbolt River • Removal of trains from Silver Street will provide more attractive neighborhood and commercial areas
• Same as above	• No significant benefits	• Same as above	• Same as above • Upgrading of housing quality/removal of blight on south bank of river	• Same as above	• Same as above	• Same as above	• Same as above
• No significant benefits	• No significant benefits	• No significant benefits	• No displacement or relocation of businesses or residences	• No significant benefits	• No significant benefits	• No significant benefits	• No significant benefits

Adverse

	TOPOGRAPHY & SOILS	WATER RESOURCES	AIR QUALITY	NOISE	VIBRATION	VEGETATION	WILDLIFE
SILVER STREET	• No adverse impacts	• Deep cuts would be detrimental to ground water	• Expanded switching activities increase emissions from switch engines	• 60 dwelling units will be exposed to noise levels in excess of 65 L_{dn} which were not previously exposed • Yard noises will increase with expanded yard activities • Rail traffic volume expansion will increase noise	• 32 dwelling units, • 15 retail enterprises, • 5 industrial enterprises adversely affected within 200' of trains	• No significant adverse impact	• No significant adverse impact
NORTH BANK	• Same as above	• Increase sediment load in Humbolt River during construction period	• Same as above	• 99 dwelling units will be exposed to noise levels in excess of 65 L_{dn} which were not previously exposed • Increases in rail traffic volume and yard activities will increase noise	• 40 dwelling units and 2 industrial enterprises adversely affected within 200' of trains	• Remove an estimated 20 acres of open range land and 40 acres of wet land • temporary removal of streamside vegetation • abrupt change in the natural vegetation and wildlife characteristics near the sewage treatment plant	• Minimum adverse impact on micro-organisms in the river a jacent to developed part of • Channelization near sewage treatment plant has greater impact on micro-organisms th easterly channelization • Fish populations in section the river which will be channelized will be considerably reduced even long after channelization • There will be a permanent an temporary loss of terrestrial wildlife habitats within the project area • Temporary reduction of willow habitat for some small birds
SOUTH BANK	• Same as above	• Same as above	• Same as above	• 154 dwelling units will be exposed to noise levels in excess of 65 L_{dn} which were not previously exposed • Increases in rail traffic volume and yard activities will increase noise	• 16 dwelling units adversely affected within 200' of the trains	• Same as above	• Same as above
NO PROJECT	• Same as above	• No adverse impacts	• Same as above • Increased emissions from delayed vehicles as traffic volumes increase	• Present nuisance to continue • 276 dwelling units exposed to noise levels in excess of 65 L_{dn} • 76 businesses exposed to noise levels in excess of 75 L_{dn} • General increase in exposure to adverse noise levels as city grows and railroad expands train operations	• 102 dwelling units and 65 commercial enterprises adversely affected within 200' of the trains	• No significant adverse impact	• No significant adverse impact

HISTORIC SITES	ARCHAEOLOGY	POPULATION	LAND USE & DISPLACEMENT	TRANSPORTATION	SCHOOLS AND EMERGENCY	UTILITIES	VISUAL QUALITY
• No significant adverse impact	• Possible disturbance of prehistoric sites No.'s EK-182 and EK-183	• 149-159 people displaced	• 22-25 owner-occupants displaced • 32-34 tenants displaced • 23-24 businesses displaced • $740,100-$822,300 relocation cost	• Does not conform to Elko Master Plan • Silver Street not useable as collector street	• Circuitous routing for emergency vehicles required for north-south access during train passage • Silver Street could not be used as a route to scene of emergency	• Involve the relocation of utility lines	• 5th Street overcrossing on Silver Street may be out of scale with surrounding urban character • View of trains from nearby motels and other downtown areas will be eliminated
• No significant adverse impact	• Same as above	• 237-264 people displaced	• 15-17 owner-occupants displaced • 86-98 tenants displaced • 13-14 businesses displaced • $631,300-$715,100 relocation cost	• No adverse impacts	• Increased traffic next to South Side Elementary School with 8th Street crossing	• Same as above	• Same as above
• Same as above	• Same as above	• 228-238 people displaced	• 14 owner-occupants displaced • 84-88 tenants displaced • 13-14 businesses displaced • $612,600-$630,900 relocation cost	• Front Street not useable as major thoroughfare	• Same as above	• Same as above	• Same as above
• Same as above	• Same as above	• Not conducive to orderly growth and attractive environment for population increase	• Present railroad location retards community development	• Existing circulation problems to continue • Traffic problems to continue with expanded railroad operations and city growth	• Continuation of present hazards and delays to pedestrian school children, school busses, ambulance, police, and fire protection vehicles	• Overhead wires to remain	• Wires, tracks and inefficient parking layout will remain • Silver Street businesses and residences will be discouraged from improvements due to condition of street with tracks and trains

Irreversible Commitment of Resources

	TOPOGRAPHY & SOILS	WATER RESOURCES	AIR QUALITY	NOISE	VIBRATION	VEGETATION	WILDLIFE
SILVER STREET	• Structures should conform to seismic Zone 3 building requirements	• Mitigation not required	• Mitigation not required	• Proposed EPA muffler regulations may reduce exhaust noise levels by 10 dB • Construct a continuous line of sight wall to reduce noise • Eliminate grade crossings to remove need for horn blowing • Encourage less noise-sensitive land used near tracks	• Discourage sensitive land uses within 200' of tracks	• No mitigation required	• No mitigation required
NORTH BANK	• Same as above • Adequate sprinkling to control dust during construction	• Provide settling ponds to remove sediment particles in Humbolt River resulting from construction operations • Construct embankment excavations rapidly • Install erosion control features rapidly	• Same as above	• Same as above	• Same as above	• Willow slips and grasses should be planted in all areas of previous construction activity • Wherever possible overhanging vegetation along the river should be preserved	• All areas disturbed during construction periods should be replanted to restore wildlife habitats • Construction should be undertaken during periods of low flow • Channel should be rip rapped through urban sections with large rocks scattered along channel bottom to improve habitat for fish and other aquatic life • A suitable gradient should be determined to maintain current during periods of low flow
SOUTH BANK	• Same as above	• Same as above	• Same as above	• Same as above	• Same as above	• Same as above	• Same as above
NO PROJECT	• Mitigating measures not required	• Mitigation not required	• Increase emission control regulations and enforcement for vehicles and train engines	• Enforce muffler regulations • Encourage railroad to use radios instead of whistles as much as possible • Increase noise insulation requirements for new buildings • Put in gated crossings and program bells to stop when gates are down	• Same as above	• Mitigation not required	• Mitigation not required

HISTORIC SITES	ARCHAEOLOGY	POPULATION		TRANSPORTATION	SCHOOLS AND EMERGENCY	UTILITIES	VISUAL QUALITY
• The context and surroundings of a once-moved Southern Pacific warehouse at the corner of Silver Street and 4th St. will be changed	• Archaeological sites may be disturbed by the project	• 85 dwelling units will be removed	• Materials and other resources needed to replace homes and businesses removed	• Materials needed for construction of various project elements inclining overcrossings, new roads, etc. • Silver Street not available for traffic circulation	• No irreversible commitment of resources	• Materials needed for replacement of utility lines	• Materials needed for landscaping • Loss of visual continunity and scale in CBD from the required size of 5th Street overcrossing
• No commitment of Historic resources	• Same as above	• 115 dwelling units will be removed	• Same as above	• Materials needed for construction of various project elements including overcrossings, new roads, etc.	• Same as above	• Same as above	• Materials needed for landscaping
• No commitment of historic resources	• Same as above	• 102 dwelling units will be removed	• Same as above	• Same as above	• Same as above	• Same as above	• Same as above
• No commitment of historic resources	• Materials needed to protect and preserve pre-historic sites	• 276 dwelling units and 76 businesses will be exposed to continual annoyance	• Areas for parking expansion will have to come from productive lands other than present railroad track area	• Materials needed for improving crossing pavements, gates, and 9th Street bridge • Replacement of vehicles damaged in accidents • Silver Street not available for traffic circulation	• Additional commitment of police cars, fire station construction, ambulance service and potential losses from fire due to delays at railroad crossing	• Same as above	• Loss of potentially attractive CBD, River Front Park, and recreation lake

Short Term Use - Long Term Productivity

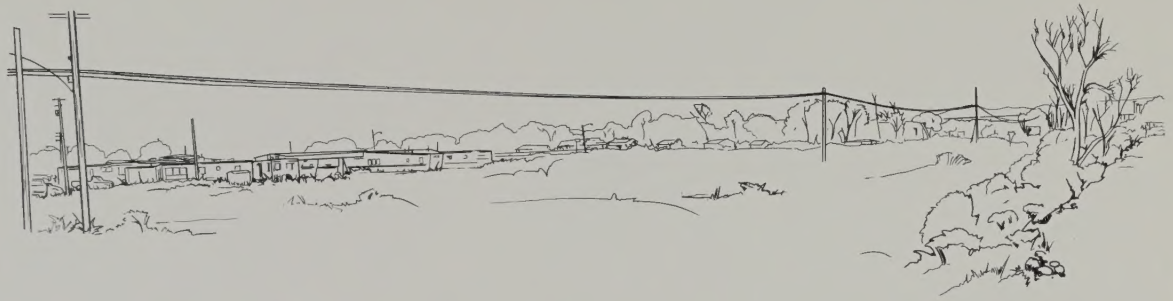
	TOPOGRAPHY & SOILS	WATER RESOURCES	AIR QUALITY	NOISE	VIBRATION	VEGETATION	WILDLIFE
SILVER STREET	• No commitment of soils resource	• No commitment of water resources	• No immediate threat of high air pollution levels - based on past history and meterological records	• Some increases in disturbance in areas not far from tracks	• Some increase in disturbance in areas not far from tracks	• No commitment of vegetation resource	• No commitment of wildlife resources
NORTH BANK	• 156,000 cu. yds. of gravel and fines for railroad fill • 111,000 cu. yds. of clays and topsoil for other project fill areas	• Same as above	• Same as above	• Same as above	• Same as above	• 20 acres of open land • 40 acres of wetland vegetation	• Micro-organisms in the river channelization will be decreased • Bird, wildlife, and fish habitats will be decreased in the area of river channelization
SOUTH BANK	• Same as above	• Same as above	• Same as above	• Same as above	• Same as above	• Same as above	• Same as above
NO PROJECT	• No commitment of soils resource	• Same as above	• Same as above	• Disturbance to motels, lounges, showrooms, restaurants, and other businesses	• Disturbances to motels, lounges, showrooms, restaurants, and other businesses	• No commitment of vegetation resource	• No commitment of wildlife resources

HISTORIC SITES	ARCHAEOLOGY	POPULATION	LAND USE & DISPLACEMENT	TRANSPORTATION	SCHOOLS AND EMERGENCY	UTILITIES	VISUAL QUALITY
• Short Term: Use of some historic areas for transportation corridor • Long Term: Through the use of plaques or markers of historic interest can be memorialized	• Short Term: Use of pre-historic site EK 82 and EK 83 for railroad corridor • Long Term: With adequate investigation of their sites prior to construction no long term loss in archaeological information	• Short Term: 85 families displaced through right-of-way acquisition • Long Term: Slight shift in population away from transportation corridor area	• Short Term: Disruption of residential areas in the vicinity of the Silver Street crossing • Long Term: Open the Railroad Commercial corridor for parking/commercial development	• Short Term: Construction of two river overcrossings and elimination of train blockage in the Commercial/Railroad Street corridor • Long Term: Increased ease or circulation in downtown Elko • Loss of Silver Street as a major collector	• Short Term: Improved response time of emergency services through the Railroad-Commercial Street corridor • Reduced potential for serious accident between school bus and train • Long Term: Same as above	• Short Term: Relocation of utility services • Long Term: Increases in efficiency from modern utility services	• Short Term: Disruption of Silver Street area by construction activities • Long Term: Conflict between the 5th Street bridge and surrounding urban scale
• Same as above	• Same as above	• Short Term: 115 families displaced through right-of-way acquisition • Long Term: Slight shift in population away from transportation corridor area	• Short Term: Disruption of residential areas in the vicinity of the Humbolt River • Long Term: Open the Railroad-Commercial Street corridor for parking/commercial development • Provide the impetus for Park development along the Humboldt River.	• Short Term: Same as above • Long Term: Same as above • Follow Elko Master Plan by using Silver Street as a major collector and expanding Front Street along the river	• Short Term: Same as above • Long Term: Same as above	• Short Term: Same as above • Long Term: Same as above	• Short Term: Disruption along the Humbolt River and surrounding neighborhoods by construction activities • Long Term: Improvement of River area by introduction of a park. Potential for improvement of Railroad/Commercial Street corridor
• Same as above	• Same as above	• Short Term: 102 families displaced through right-of-way acquisition • Long Term: Slight shift in population away from transportation corridor area	• Same as above	• Short Term: Same as above • Long Term: Same as above	• Short Term: Construction activity near South Side Elementary School • Long Term: Conflict between use of South Side Elementary School and train operations	• Short Term: Same as above • Long Term: Same as above	• Same as above
• Same as above	• No Short Term use or change in Long Term productivity of archaelogical sites	• Short Term: No change in population characteristics adjacent to the existing corridor • Long Term: Decrease in population productivity due to increasing irratation and annoyance from expanding rail operations	• Short Term: Continued annoyance from sensitive residence and businesses from train operations • Long Term: Loss of potential commercial development in CBD because of increasing disruption from expanded railroad operations • Loss of potential recreation development along Humbolt River	• Short Term: Loss of Silver Street as a major collector • Long Term: As railroad operations expand increasing irratation of drivers because of delays and continual inefficient traffic circulation	• Short Term: Continued delays to emergency vehicles • Long Term: As railroad operations expand increase in potential losses of life and property resulting from delays	• Short Term: Same as above • Long Term: Same as above	• Short Term: Continued disruption of Silver Street, Commercial Street, and Railroad Street by railroad activities • Long Term: Potential for improving the visual quality of the Commercial/Railroad Street corridor is poor • Potential for improving the visual quality of the river front area is poor

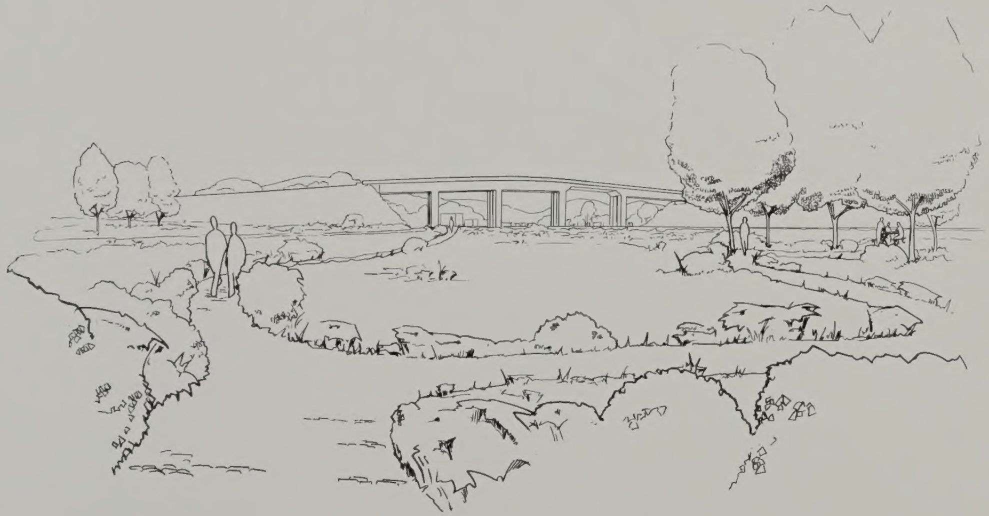
Mitigation

	TOPOGRAPHY & SOILS	WATER RESOURCES	AIR QUALITY	NOISE	VIBRATION	VEGETATION	WILDLIFE
SILVER STREET	• No commitment of soils resources	• No commitment of water resources	• Short Term: slight increase in pollution levels from expanded yard activities • Long Term: same as above	• Short Term: Increase in noise from construction • Long Term: Stress on affected residents will decrease and activity levels can be incurred	• Short Term: Increase in vibration from construction activities • Long Term: With increased rail operations vibration and therefore stress on affected residents will increase and activity levels decrease	• No short term use on change in long term productivity for vegetation	• No Short Term use or change in Long Term productivity in wildlife resources
NORTH BANK	• Short Term: commitment of soils resource for project fill requirements • Long Term: reuse of their resources to improve transportation efficiency and recreational opportunities	• Short Term: some disturbance in Humbolt water quality during construction • Long Term: water quality will return to present levels one time	• Same as above	• Same as above	• Same as above	• Short Term: Use of 20 acres of range land and 40 acres of wetland for transportation corridor • Long Term: Gradual return of productivity in disturbed areas adjacent to the actual rail and chanellized corridor	• Short Term: 20 acres of rangeland and 40 acres of wetland habitats taken for transportation corridor • Long Term: Gradual return and in some cases increases in productivity of habitats affected by construction
SOUTH BANK	• Same as above	• Same as above	• Same as above	• Same as above	• Same as above	• Same as above	• Same as above
NO PROJECT	• No commitment of soils resources	• No commitment of water resources	• Same as above	• Short Term: Little short term increase in existing noise • Long Term: With increase rail operations noise and therefore stress on affected residents will increase and activity levels decrease	• Short Term: Little short term increase in existing vibration • Long Term: With increased rail operations vibration and therefore stress on affected residents will increase and activity levels decrease	• No Short Term use in change in Long Term productivity in vegetation resources	• No Short Term use or change in Long Term productivity of wildlife resources

HISTORIC SITES	ARCHAEOLOGY	POPULATION	LAND USE & DISPLACEMENT	TRANSPORTATION	SCHOOLS AND EMERGENCY	UTILITIES	VISUAL QUALITY
• Preserve historic wharehouse at the corner of Silver Street and 4th Street	• Care should be taken during construction in the area of pre-historic sites No. 26 EK 182 and EK 183	• Relocation assistance will be available	• Homes and businesses relocated will be eligible for Federal Relocation Assistance • If existing replacement housing is not available, as a last resort, a housing plan could be developed to determine how and where replacement housing could be provided	• Revise Master Plan • Designate a street, other than Silver Street, as a major collector on the Master Plan	• Increase staff of South Side Fire Station • Instill an attitude of safety in school children crossing tracks	• Mitigation not required	• Enhance other areas within the CBD to direct attention away from tracks
• No mitigation required	• Same as above	• Same as above	• Same as above	• Mitigation not required	• No mitigation required	• Same as above	• Encourage continued parkland development • Design attractive railroad track location and appearance
• No mitigation required	• Same as above	• Same as above	• Same as above	• Same as above	• Same as above	• Same as above	• Same as above
• No mitigation required	• Preserve pre-historic sites at 26 EK 182 and EK 183	• Promote community development in areas away from the railroads to de-emphasize their location	• Mitigation not required for displacement • Encourage community development away from railroad tracks	• Redevelop existing crossings for smoother passage • Install automatic gates • Replace 9th Street bridge	• Build and staff new Fire Station on south side of tracks • Institute hot lunch program at South Side Elementary School to eliminate lunch-time crossings • Add personnel to police force • Locate another ambulance on south side of tracks • Instill an attitude of safety in children crossing tracks and use crossing guards at railroad crossings	• Same as above	• Place the utility lines underground • Landscape around tracks between Railroad and Commercial Streets



EXISTING VIEW FROM THE SOUTH SIDE OF THE HUMBOLDT LOOKING WEST TOWARD THE PRESENT FIFTH STREET BRIDGE.



VIEW FROM THE SAME LOCATION LOOKING ACROSS A LINEAR PARK TOWARD THE PROPOSED FIFTH STREET BRIDGE.

Section 27

Yard Relocation to the East of Elko

INTRODUCTION

Relocation of the WPRR yard to the east of Elko on a site far from existing population will eliminate the present land use and operations conflict with the surrounding community.

While a new site for the yard has not been selected, it will certainly be in an area of typical pandemic vegetation. The distance between the new site and the city of Elko will be sufficient to mitigate effects on nearby populations from noise, vibration, and air pollution resulting from yard operations. However, these effects will be noticeable in the uninhabited area immediately adjacent to the site.

The great flexibility in choosing a new location for the yard will allow careful attention to the effects of a yard on environmental conditions, e.g., sun, wildlife, vegetation, water resources, historical and archaeological resources, and visual quality. The site finally selected can be one that will minimize adverse effects on its surroundings while maintaining the efficiency of railroad operations.

TOPOGRAPHY AND SOILS

WPRR yard relocation to the east of Elko will eliminate 2200 feet of channelization required for both North and South Bank Alternatives using the existing yard. No extensive grading will be required to redevelop the existing WPRR and SPT Co. property. However, to develop adjoining City of Elko land between the new main line and WPRR property may require extensive filling of oxbows and other areas included within the present Humboldt flood plane. Leaving this area undeveloped will comply with Community Development Goal 6, objective 1:

> "That areas not suitable for residential, industrial, commercial or public buildings because of soil, drainage, or topographic considerations should be avoided for such development."

WATER RESOURCES

Relocating the yard will improve water quality in the adjacent Humboldt River by reducing channelization requirements and eliminating wash water, oil, and other contaminants that may presently reach the river. Drainage facilities and sewage treatment in a relocated yard will eliminate percolation into the surrounding water table and river from untreated runoff.

AIR QUALITY

Local air quality will be improved through yard relocation by eliminating switching and other yard activities.

NOISE

The numbers of residents and businesses presently exposed to excessive noise levels will be reduced through yard relocation. This reduction will occur primarily in two residential areas: to the south of the yard on River Street and north (the adjacent portion Idaho Street, U.S. Route 40). The affected commercial/industrial areas lie to the east and north of the yard, to the south of Idaho Street, and west of 3rd Street.

A preliminary assessment of noise reduction indicates that there are presently 276 homes in the area subject to noise levels in excess of 65 Ldn. With yard relocation this number will be reduced to 200.

VIBRATION

Vibration effects on surrounding businesses and residents from switching and other yard operations will be eliminated by relocation.

VEGETATION

Vegetation within the existing yard and adjacent portions of the Humboldt River will be improved through relocation. By reducing the need for channelization, mature wetland vegetation along the river edge will be retained.

Vegetation will recover slowly within the present yard area because of the oil and other contaminents that have penetrated the soil. Over time, these contaminents will be leached away, and permanent prarie plants of sage, grasses, and willows will return.

WILDLIFE

Habitats for fish, birds, small mammels and micro-organisms which would otherwise have been removed for channelization will be retained through yard relocation. The wetland areas west of the yard site are very sensitive to any changes in the river flow and water quality characteristics. Reducing the amount of channelization will help to insure the continued productivity of those habitats.

HISTORIC SITES

Two historic sites which represent periods in Elko's past will be affected by yard relocation. However, neither of these sites, the foundations for the WPRR Round House, and grading for the eastern Nevada Railroad, are presvisible. The Round House foundations can be easily observed from the air, but are not clearly apparent on the site. The eastern Nevada Railroad grading was removed in 1910 during construction of the present yard. The location of these two sites should be noted on markers on plaques as a reminder of unique periods and events in Elko's development.

ARCHAEOLOGY

No archaeological sites have been identified in the area affected by yard relocation.

POPULATION

There are no residences within the WPRR yard that would be affected by relocation. Residential areas exist to the south of the yard on River Street, and to the north on Court, Pine, and Juniper Streets. The effect of yard relocation on these residences will be in the reduction of air pollution, noise, and vibration from yard operations.

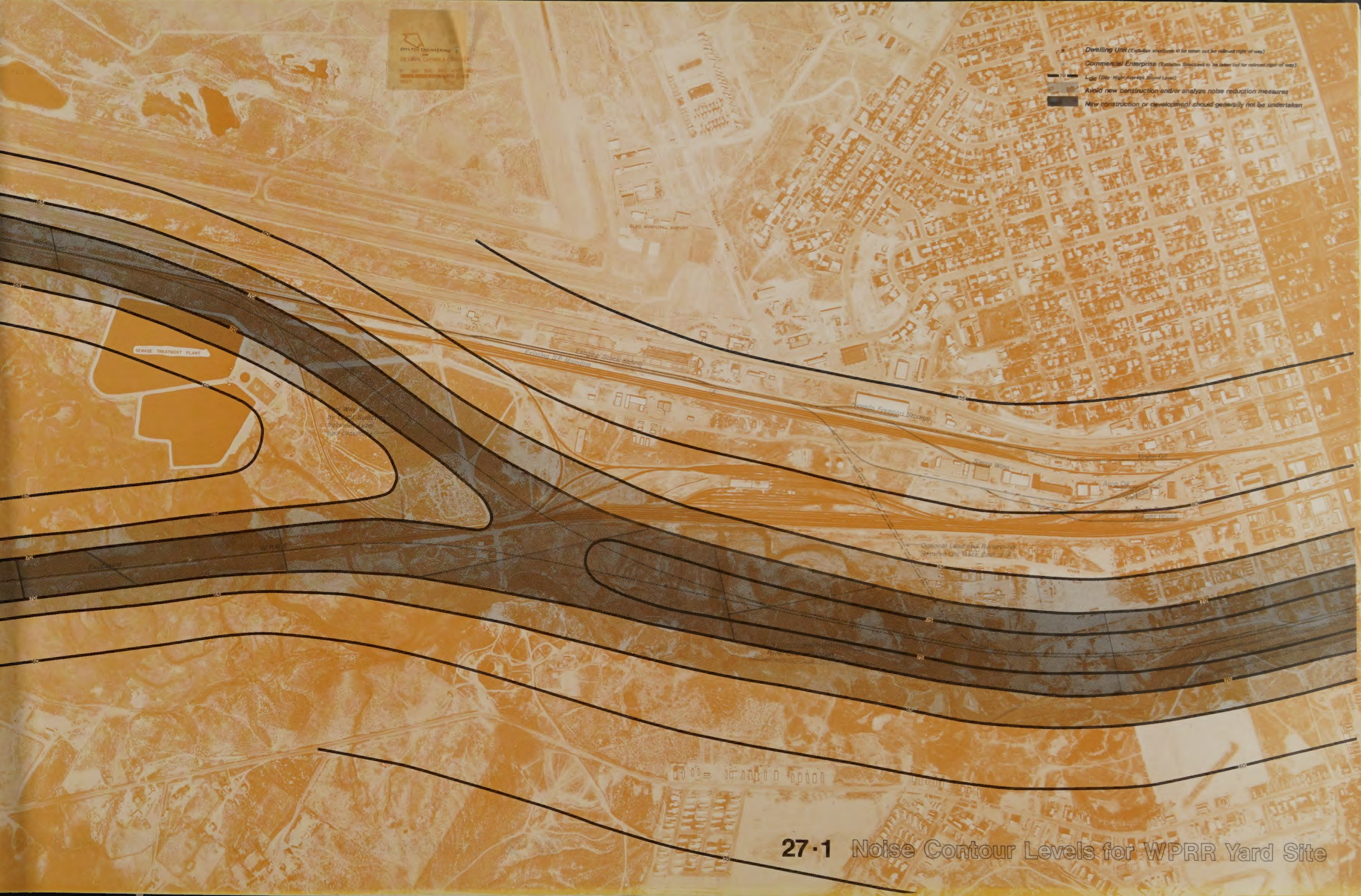
The adjustments in the main line near First and Second Streets resulting from by yard relocation will reduce the displacement necessary with the existing North and South Bank Alternatives. In the block bounded by First, Douglass, and Second Streets, eight residences will not be displaced if the yard is relocated. However, one farm house will be displaced near the hot hole by the new allignment with yard relocation.

LAND USE

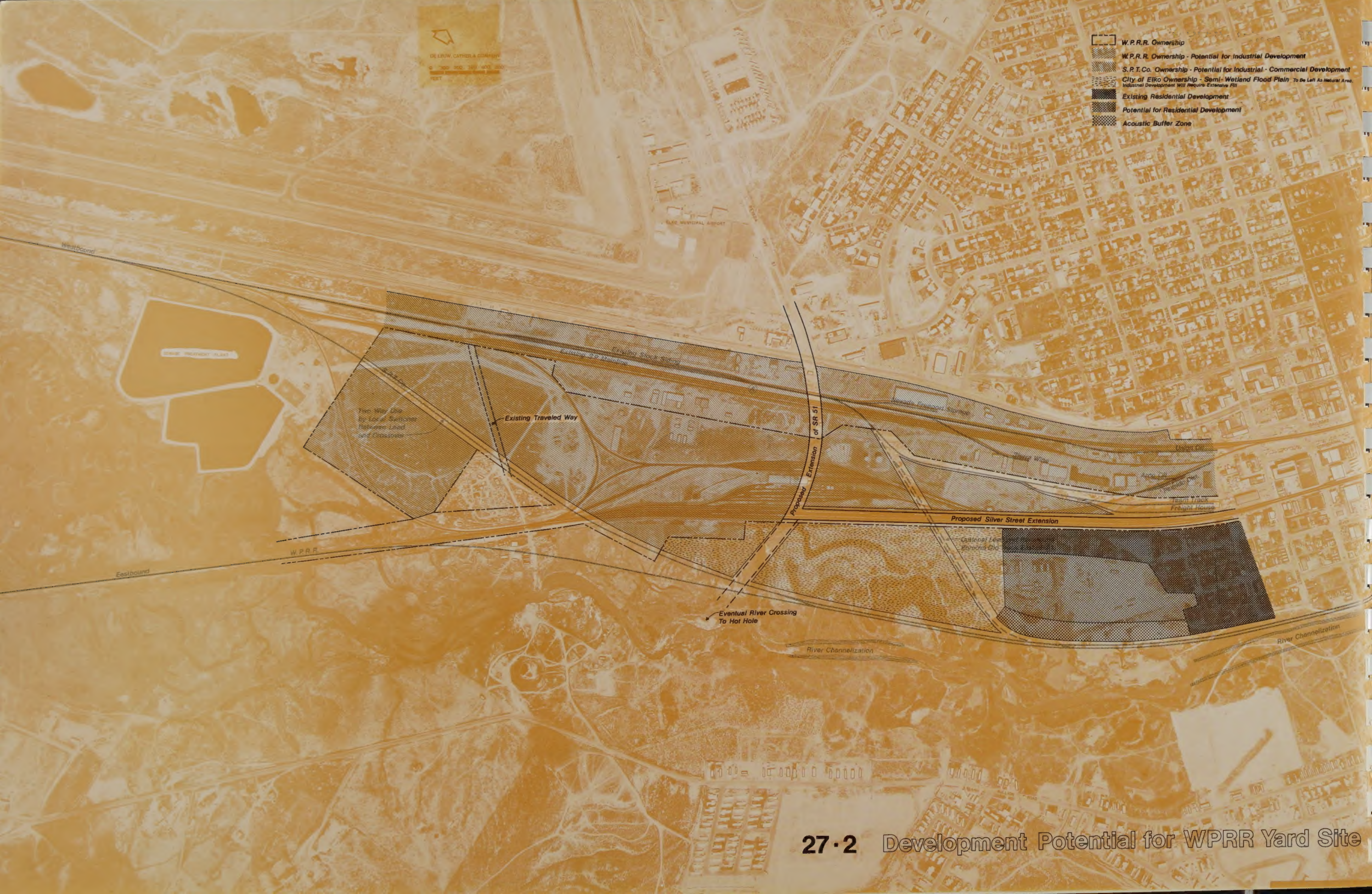
Land use within the existing yard area is comprised of railroad operations. Yard relocation would release 100 acres of WPPR land, 40 acres of SPT Co. land, and 28 acres of City of Elko land for potential redevelopment.

The Elko master plan of January 1974 indicates the most appropriate use of this area will be for industrial activities. Figure 27-2 shows the location of various properties, their suggested re-use on the master plan, and the natural constraints that may affect this development. The City of Elko land to the south of the existing WPRR main line is presently a semi-wetland flood plane. It is inundated occasionally during periods of high water and its sloughs, abandoned ox-bow channels, retain water for portions of the year. The area will be cut off from the main Humboldt Channel with removal of the yard and relocation of the main line. To maintain ground and surface water circulation in this area drainage pipes should be liberally spaced along the length of the main line right-of-way.

Outside of the WPRR property, there are a number of existing industries in the area bounded by Idaho, Third, and River Streets. These industries include the existing stock siding, Nevada Freight Storage, Serria Wine Company, Arco oil, Union oil, Peraldo Distributing Company, to name a few. These industries form the nucleus for expanded industrial development that could occur with relocation of the yard.


CHILTON ENGINEERING
and
DE LEUW, CATHER & COMPANY
0 100 200 300 400 500
FEET
Dwelling Unit (Excludes structures to be taken out for railroad right-of-way)
Commercial Enterprise (Excludes Structures to be taken out for railroad right-of-way)
70 L_{dn} (Day-Night Average Sound Level)
Avoid new construction and/or analyze noise reduction measures
New construction or development should generally not be undertaken
ELKO MUNICIPAL AIRPORT
SEWAGE TREATMENT PLANT
Existing SP Mainline
Existing Stock Siding
U.S. 40
Nevada Freeport Storage
Union Oil
Arco Oil
Freight House
Optional Lead and Runaround
Remove Old Track East of A
W.P.R.R.
55
60
65
70

27·1 Noise Contour Levels for WPRR Yard Site


W.P.R.R. Ownership
W.P.R.R. Ownership - Potential for Industrial Development
S.P.T.Co. Ownership - Potential for Industrial - Commercial Development
City of Elko Ownership - Semi-Wetland Flood Plain To Be Left As Natural Area. Industrial Development Will Require Extensive Fill
Existing Residential Development
Potential for Residential Development
Acoustic Buffer Zone
DE LEUW, CATHER & COMPANY
0 100 200 300 400 500
FEET
ELKO MUNICIPAL AIRPORT
Westbound
Eastbound
W.P.R.R.
Two Way Use by Local Switcher Between Lead and Crossover
Existing Traveled Way
Existing Stock Siding
Proposed Extension of SR 51
Nevada Freeport Storage
State Wide
Union Oil
Arco Oil
Team Track
Freight House
Proposed Silver Street Extension
Eventual River Crossing To Hot Hole
River Channelization
River Channelization

27·2 Development Potential for WPRR Yard Site

TRANSPORTATION

Relocation of the yard will allow the completion of access routes as indicated on the master plan. Specifically mentioned is the extension of State Route 51 across the site to an eventual crossing of the Humboldt River near the Hot Hole, and extension of Silver Street to join State Route 51. These planned additions to the traffic and circulation plan for Elko will only be possible with the relocation of the WPRR yard. The following description will outline the short and long term growth implications of these street extensions.

- State Route 51

  As shown on the master plan S.R. 51 crosses the site and forms a western crossing of Humboldt near the Hot Hole. This crossing will not be required in Elko's traffic circulation in the near future, but is a long range option that will eventually stimulate growth to the southwest.

  The extension of S.R. 51 to connect with Silver Street could have more short term benefits by redirecting industrial traffic away from the downtown. Access to the industrial uses presently included within the SPT & Co. right-of-way is now on Third Street adjacent to the Stockman's Hotel, the Commercial Hotel, and the post office. This conflict between heavy truck traffic and tourist/retail traffic will be a continuing annoyance and detriment to downtown development. The problem will increase with expansion of both the industrial uses and growth of retail/tourist/commercial activities in the Railroad/Commercial Street corridor.

- Silver Street

  The extension of Silver Street to connect with S.R. 51 will complete the circulation network discussed in the previous paragraph. The use of Silver Street as a collector to redirect local traffic away from the commercial/Railroad Street corridor will improve the congested condition presently occurring on Third Street and will allow greater use of the corridor for parking and open space activities directly related to surrounding commercial establishments.

  These benefits from an improved circulation system, as outlined in the master plan, can only be accomplished through the relocation of the WPRR yard.

SCHOOLS AND EMERGENCY SERVICES

Relocation of the yard will not directly affect schools and emergency services within Elko. However, with the introduction of the Silver Street and S.R. 51, extensions it will be possible for emergency vehicles to bypass conjestion in an emergency situation.

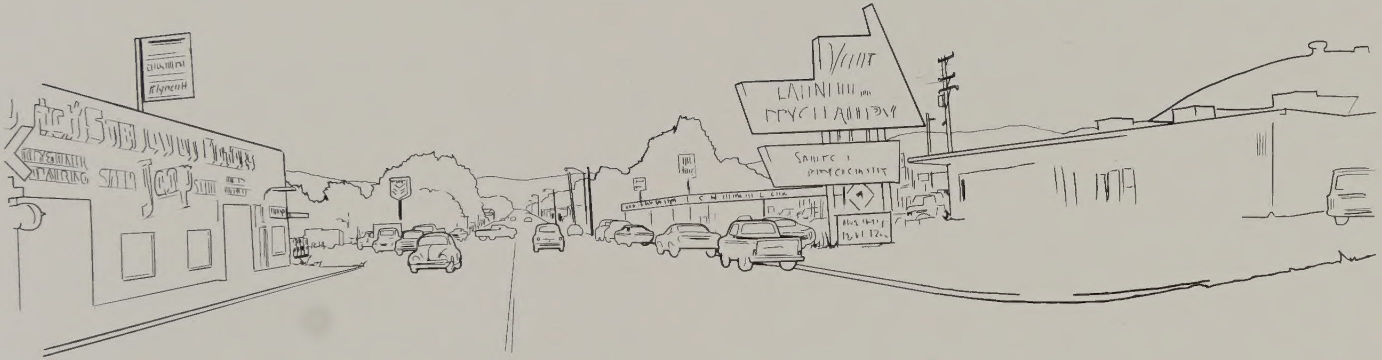
UTILITIES

Present utility connections adjacent to the yard include a six inch water and 18" and 24" sewer main along main street. There is a 2" water main and 6" sewer main along River Street. Relocation of the yard will not affect this service and these utilities will be available for future development in the area.

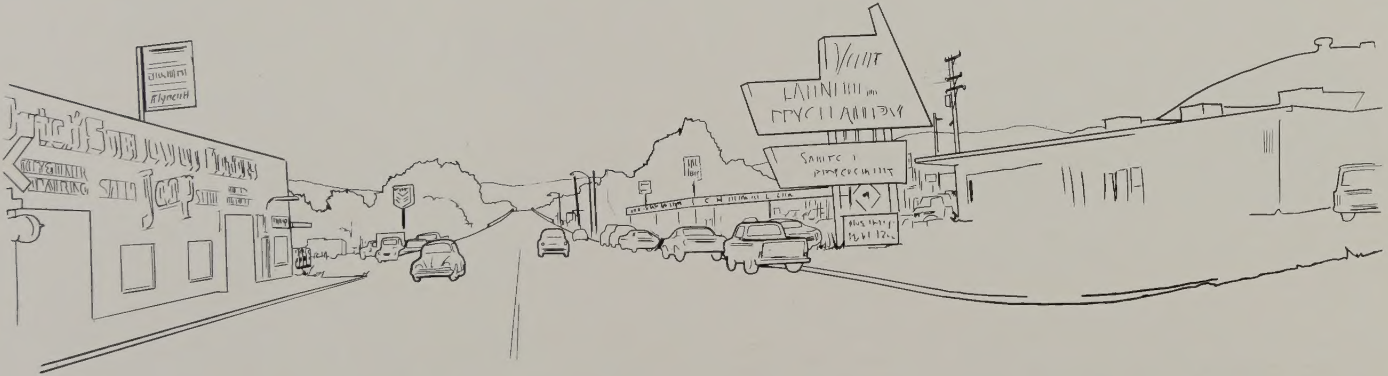
VISUAL QUALITY

Visual Quality will be affected by yard relocation by the removal of box cars, switching engines, and the general appearance of activity. With removal of the yard the usual impression will be of abandoned facilities with the scars caused by the removal of trackage, equipment, and buildings.

With the gradual redevelopment of the area for industrial uses, however, the usual impression of a well organized and active urban space will return.



VIEW OF THE EXISTING FIFTH STREET BRIDGE FROM THE CORNER OF FIFTH AND SILVER STREETS



VIEW OF THE PROPOSED FIFTH STREET BRIDGE FROM THE CORNER OF FIFTH AND SILVER STREETS

Part VII

Benefit · Cost

SECTION 28. BENEFIT-COST ANALYSIS

Section 28

Benefit · Cost Analysis

INTRODUCTION

In Section 163 (a) of the Federal Aid Highway Act of 1963, under which railroad consolidation demonstration projects in various cities, including Elko were authorized, the following phrase appears: "....which has a favorable benefit-cost ratio involving...." The several sections which follow present a narrative explanation of some of the tangible and intangible benefits which have been identified and can be expected to accrue to the total overall community, including the motoring public, the railroad, citizens of Elko, public and private agencies, etc., as a result of track consolidation. In estimating the benefits and costs, the analysis has attempted to be stringent rather than liberal. Transfer effects and secondary benefits have been, whenever perceivable, eliminated from the analysis. As with every benefit-cost analysis, however, some benefits and costs are simply not susceptible to monetary evaluation. It is recommended therefore, that such impacts as increased amenity and convenience not be overlooked in the evaluation of the project.

A total of twelve alternative railroad consolidation projects have been discussed in the foregoing report. For the purposes of benefit-cost analysis, the project costs are summarized by three basic project plan headings in addition to the "no build" alternative; Silver Street Alignment, North Bank Alignment, South Bank Alignment, with single item cost modification to each plan to give estimates for all the alternatives.

Upon approval, construction would commence in 1976 and terminate in 1980. Therefore, the benefit-cost analysis will be performed on the 25-year time period from 1976 to 2001, with the flow of project benefits occurring from 1981 on.

The items of benefits that are expected to accrue to the community and the railroad as a result of the project are as follows:

- Railroad Benefits
  Increased operating costs (negative)
  Savings in train running time
  Reduced freight per diem payments
  Elimination of need for grade crossing protection devices
  Reduction in new track facility maintenance cost
- Highway User Benefits
  Reduced vehicle delay
  Reduced vehicle accidents

- Reduced community disruption
- Increase in Property Tax of Yard Land
- Tourist-Commercial Benefits
- Flood Control Benefits
- Emergency Service Benefits

The results of the benefit-cost analysis are in terms of the net worth of each alternative program as of the year of implementation. Net "present worth" implies that all flows of costs or benefits are stated in terms of their present worth as of the date of expenditure of the proposed investment, which is taken as a common time base -- namely, 1976. The critical parameter involved in collapsing benefits and costs to a single year is the discount rate. In every instance, the benefit-cost analysis proceeded under the assumption that the only relevant benefits were those that were directly attributable to the railroad relocation. Two cases were normally considered: (1) what would have happened under the no-build alternative, and (2) what would be expected to happen with the railroad relocation. For the former case, this would consist of extrapolating the historic trend through the planning period, and then estimating the impacts of the railroad relocation on this trend case.

RAILROAD BENEFITS

The monetary benefits accruing to the railroads following proposed consolidation under the three most promising plans will fall under the following several categories:

Distance and Curvature

Any increase or decrease in operating distance causes a corresponding change in railroad operating costs. Changes in total central angle of curvature also affect railroad operation costs. The service life of rail in curved track is shorter, and the cost of operating trains due to the increased frictional resistance is greater than on tangent track. Table 28-1 shows comparative distances and curvatures for the three track relocation plans.

Since train crews are paid in basic 100-mile workday units rather than by the hour, savings in railroad running time between terminals have only a minor effect on labor costs. Railroad management has advised that the increased travel distance resulting from the three most promising realignments through Elko would not require any increase in employee compensation, since the fractional increase in mileage is insufficient to place the run in the next one-mile pay bracket.

Increased operating costs due to increased travel distance and increased total central angle of curvature for the initial years of operation are estimated as follows:

	Silver Street	North Bank	South Bank
For Southern Pacific	$4,000 per year	$16,000 per year	$20,000 per year
For Western Pacific	$1,200 per year	$ 5,000 per year	$ 6,000 per year

Savings in Running Time

It is estimated that running times between terminals will change by the following amounts for the two railroads:

	Silver Street	North Bank	South Bank
Southern Pacific, eastbound, Save:	14 min. 24 sec.	14 min. 18 sec.	14 min. 06 sec.
Southern Pacific, westbound, Save:	6 min. 11 sec.	6 min. 04 sec.	6 min. 04 sec.

Western Pacific: All trains must stop in yard; savings in running time negligible.

It is recognized that faster rail operations offer more competitive service to shippers, and expeditious service is also an intangible benefit to the nation's economy. The cost of operation of trains is taken at $25.00 per train hour, although costs as high as $60.00 per train hour are used by some authorities.

Based on 3,450 eastward trains and 3,842 westward SP trains annually, the estimated savings would approximate as follows:

Alignment	Annual Savings
Silver Street	$31,000
North Bank	$30,000
South Bank	$30,000

Freight Car Per Diem Payments

The average daily rate paid by each of the nation's railroads for the use of foreign cars on its system is $3.88 per day. Faster operating speed and running times offer the opportunity of reducing the length of time that foreign cars are subject to per diem payments. For cars owned by the operating carrier, and not subject to direct per diem payments, an equivalent daily rate may be used to reflect the increase in car availability, reduction in the minimum size of the car fleet, or potential revenue to the owner from foreign carriers. Privately owned or leased cars are excluded from the computations because their compensation is on a mileage rather than a time basis.

These per diem savings, applicable only to Southern Pacific because the saving in running time applies only to that railroad, are estimated below, based on 1973 traffic volumes, and will increase with the overall growth of freight traffic over the next 25 years.

Alignment	Per Diem Savings per Year
Silver Street	$19,000
North Bank	$18,000
South Bank	$18,000

Grade Crossings and Automatic Protection

The present flashing light protection at the several grade crossings in Elko is substandard and does not meet current needs. If the tracks are not consolidated or separated, it is very likely that automatic gates would be installed in the very near future at each of about ten grade crossings, at a cost of around $35,000 per crossing. Such installations also require maintenance, costing on the order of $2,000 per year per installation. Thus, a comprehensive grade separation program would effectuate a one-time saving of $35,000 at each of ten grade crossings (for the north and south bank plans), together with aggregate maintenance savings of about $20,000 per annum.

Reduction in Cost of Maintenance of New Track Facility

The new main line tracks to be constructed, extending over the length of about three miles, will be composed of new crossties, ballast, and continuous welded rail. Under ICC accounting procedures and Federal Highway Administration Policy and Procedure Memoranda, such new track is not recognized as a benefit toward which the railroads must contribute. However, for economic analysis, these benefits should be included as reflecting a future saving to the railroads.

To illustrate, new 136 lb. rail should have a service life of 700,000,000 gross tons on tangent track, which would imply some 20 years of service after installation before replacement would be required.

Table 28-1

COMPARISON OF EXISTING AND PROPOSED RAILROAD ALIGNMENTS, ELKO NEVADA

	Existing Alignment	Silver Street Proposed	Alignment Difference	North Bank Proposed	Alignment Difference	South Bank Proposed	Alignment Difference
WESTBOUND (via SPT Co.)							
Total Central Angle of curvature	26° 00'	92° 00'	+66° 00'	114° 00'	+88° 00'	115° 00'	+89° 00'
Total Length of Line	12,585 ft.= 2.3835 mi.	12,900 ft= 2.4432 mi.	+315 ft.= 0.0597 mi.	13,570 ft.= 2.5701 mi.	+985 ft.= +0.1866 mi.	13,770 ft.= 2.6079 mi.	+1185 ft.= 0.2244 mi.
Running Time (SP only)	16min.57sec.	10min.46sec.	-6min.11sec*	10min.53sec.	-6min.04sec*	10min.53sec.	-6min.04sec.*
EASTBOUND (via WPRR)							
Total Central Angle of curvature	17° 00'	17° 00'	0° 00'	96° 00'	+79° 00'	117° 00'	+100° 00'
Total Length of Line	12,680 ft.= 2.4015 mi.	12,680 ft.= 2.4015 mi.	0 ft.= 0 mi.	13,165 ft.= 2.4934 mi.	+485 ft.= +0.0910 mi.	13,365 ft.= 2.5313 mi.	+685 ft.= 0.1297 mi.
Running Time (SP only)	28min.28sec.	14min.04sec.	-14min.24sec*	14min.10sec.	-14min.18sec*	14min.12sec.	-14min.16sec*

* Denotes total time saving per train trip, including deceleration outside of the City, slower speed through the City and time required to regain normal speed after leaving the City.

During the first 25-year period, tie renewals should be minimal. There will be no need to pick up low joints in bolted rail, and the average normalized cost of maintenance of main line track should be substantially reduced.

To simplify the financial analysis, it is assumed that the proposed new track facilities for the two railroads would obviate the need ten years hence for a complete tie and rail renewal program, the cost of which would be somewhat as follows:

First Main Line Rail, 5.9 miles at $60,000/mile = $354,000
crossties, 5.9 miles at $47,000/mile = $276,000

Auxiliary Tracks, Relay Rail, 8.8 miles at $40,000/mile = $352,000
crossties, 8.8 miles at $47,000/mile $413,000

More Efficient Yard Operations for Western Pacific

The rearrangement of trackage necessitated for Western Pacific will result in a more compact, efficient and economical yard layout. For instance, eastbound and westbound yard inspection will take place on the same tracks rather than at widely dispersed locations as at present. Long trains will be able to enter the yard without doubling. The rearrangement of trackage in Elko may be selected in a reduction in congestion and more efficient operation in the yards at the Portola and Stockton, California.

The dollar value of improved and more efficient yard operations is conservatively estimated at $200,000 per year.

A summary of the railroad benefits is contained in Table 28-2.

HIGHWAY USER BENEFITS

Highway Delay Benefits

Highway benefits from railroad consolidation and grade separation are measured in terms of 1) the anticipated reduction of motor vehicle delay on Railroad, Commercial and Silver Streets due to train traffic, and 2) anticipated reduction of vehicle operating costs for slowing or stopping at grade crossings and for maintenance.

A 1974 delay and turn movement survey at selected grade crossings indicated that there are approximately 36,408 vehicles crossing the Southern Pacific and Western Pacific tracks each day. Three percent of these vehicles are delayed by traversing trains for an average of 2.2 minutes per vehicle. Past trends and projected population growth assumptions indicate that traffic volumes across the SP and WP tracks will increase substantially between 1980 and 2001. This will be due to a continuing increase in development of residential areas to the south of the Humboldt River and an expanding central business district north of the SP tracks to accommodate the City's growing population.

The methodology for deriving motor vehicle delay benefits involved the determination of yearly traffic volumes in the study period, the proportion of those volumes that would be delayed by the passage of trains and the resultant total vehicle hours of delay (see Appendix 8).

Yearly increased in vehicle traffic volumes and train volumes (based on railroad tonnage projections) were projected in the determination of total delay times and a value of time of $3.45 per hour, per vehicle, was applied in order to obtain the dollar benefit of reduced delay. This value of time represents a composite cost based on a time value of $3.00 per passenger car hour and $6 per hour for commercial vehicles.*

The total discounted delay cost, i.e., the sum of the yearly delay costs from 1980 to 2001, represents the negative benefit for the no-built alternative and the positive benefit for the Silver Street, North and South Bank alternatives.

The reduction in vehicle operating costs due to the necessity of slowing down at grade crossings applies to all vehicles that must cross the tracks and therefore incur maintenance costs of wear and tear on the automobile and fuel consumption costs to accelerate after slowing or stopping. A cost of 0.628 cents per crossing was used to derive the dollar benefit derived from railroad consolidation and grade separation (or, the negative benefit for the no-build alternative). The schedule of the undiscounted benefits from reduced vehicle operating costs is summarized in Table 28-3.

Highway and Pedestrian Accidents

During the past ten years in Elko, there have been over thirty vehicular and pedestrian accidents involving numerous injuries and four deaths. With projected increases in cross-track traffic due to the growing section of the population located south of the tracks and CBD growth north of the tracks, and projected increases in train traffic, accident potential will be such that protection devices will be installed at ten of the seventeen crossings in the no-build alternative. This would serve to reduce the expected number of accidents to one per year for the entire study period. Accidents involving fatalities would probably be eliminated altogether.

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*Federal Railroad Administration, Report to Congress, Railroad-Highway Safety Part II: Recommendations for Solving the Problem. August 1972.

The cost of vehicle and pedestrian accidents includes the estimated loss to society from personal injuries and property damage. The costs used in this analysis were derived from data reported in 1972 by the National Highway Traffic Safety Administration* and the Joint Federal Railroad Administration-Federal Highway Administration's "Report to Congress: Railroad-Highway Safety, Part II: Recommendations for Resolving the Problem."** Cost data for 1972 have been inflated by 15 percent to reflect mid-1974 prices. The loss to society from personal injuries was estimated for each of three categories of injury: (1) permanent and total disability (300,000); (2) partial disability ($75,000) and (3) no permanent disability ($2,200). Statistical weighting of the three injury categories by FRA and FHWA resulted in an estimated cost of $25,000 for an injury incurred in an urban grade crossing accident. Motor vehicle property damage costs were estimated at $1,000 for an urban accident. Therefore, the benefit derived from accident avoidance is estimated at $26,000 per year.

Table 28-2

SUMMARY OF RAILROAD BENEFITS

	Annual Benefits						One Time Benefits
	Silver Street		North Bank		South Bank		
Category	(1980)	(2001)	(1980)	(2001)	(1980)	(2001)	
Distance and Curvature*	($5,000)	($7,000)	($21,000)	($28,000)	($26,000)	($35,000)	
Running Time	$31,000	$41,000	$30,000	$40,000	$30,000	$40,000	
Per Diem Freight Cars	19,000	$25,000	$18,000	$24,000	$18,000	$24,000	
Grade Crossings and Installation No. 9 Standard Automatic Gates	$8,000	11,000	$20,000	$27,000	$20,000	$27,000	
Track Maintenance							
Main Line							$630,000 (in 1985)
Secondary Tracks							$765,000 (in 1985)
Yard Operations	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	
TOTAL	$253,000	$270,000	$247,000	$263,000	$242,000	$256,000	$1,395,000 for the Silver Street Plan, North Bank, and South Bank plans.

*Parentheses indicate negative benefits

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*Societal Costs of Motor Vehicle Accidents, National Highway Safety Administration, April, 1972.

**August, 1972; page 77.

Table 28-3

HIGHWAY DELAY BENEFITS: REDUCED DELAY COSTS

Year	Total Daily SP & WP Vehicle Crossings	% Vehicles Delayed	Annual Cost of Delay	Annual Cost of Crossing
1980	45,609	3.9	$ 81,019	$ 104,544
.				
.				
.				
2001	81,056	.071	$ 262,087	$ 185,797

BENEFITS RESULTING FROM REDUCED COMMUNITY DISRUPTION

One of the major benefits accruing to the City of Elko from railroad relocation is the reduction in community disruption. Disruption is caused by noise, vibration, loss of adequate property access to businesses and residences, and other more subjective qualities of the community that are disturbing to personal well-being. However, the dollar value of removing the disruption is difficult to quantify for the following reasons:

- Individuals become accustomed to disturbing elements and discount the real value of their removal.
- The removal value is different for each individual, family, and business enterprise.
- Through a self-selection process the individuals affected by the disruption are those who are or have become least sensitive to its effect on their lives.

The complexity involved with placing a value on these community disruptions can be further explained by the following example. There is a bottling plant in Elko with warehouses in two locations: one relatively near the existing SPT Company main line and the other located many blocks away. In the warehouse near the tracks, only two bottle cases can be stacked on top of one another because of vibration. In addition, the cases have to be realigned every two days. In the location further from the tracks, the cases can be stacked three high and never have to be realigned.

The cost in loss of warehouse efficiency because of stacking and increased labor for the needed realignment is the disruption benefit from railroad relocation for that industry. While the particular details of these problems vary for each industry and household presently affected by the railroad, when added together they represent the total value of disruption.

To place a valve on this disruption, the land valve increase to property directly adjacent to the railroad tracks with the tracks removed was calculated. The tax assessor and a committee of realtors reported block by block the value increase of the property facing the railroad tracks between Second Street and Eleventh Street. The blocks between Second and Fourth Streets were not used in the final analysis because of the casinos which are taken care of under the tourist commercial benefits. The land value increase in the area varied block by block. Calculation resulted in a land value increase in the downtown area of $890,000 to take place over five years. This value is over and above the normal value increase of land in Elko.

Due to the nature of present zoning and land use, no detrimental or negative economic effects are anticipated for parcels of property which may be located closer to rail lines in the "after" condition. Analysis showed reduced horn noise, and increased distance from trackage made negative value impact negligible.

INCREASE IN PROPERTY TAX OF YARD LAND

Removal of the existing Western Pacific Railroad yard allows development in the area which results in an increase in the tax revenue of the City and County of Elko. The local tax structure is based on the assessed valuation per track-mile. Once the yard is removed, this will place 13 miles of yard track in the County which has a tax rate of 3.04 percent of the Assessed Valuation versus a tax rate of 3.83 percent within the City. This creates a loss of $1,736.72 to the City of Elko and a gain of $1,378.50 to Elko County per taxable year. The City will then have the yard lands placed on its tax rolls creating $23,384.13 of tax revenue it does not now receive. This creates a total benefit of $23,025.91 per year of taxable income, to the City and County.

TOURIST COMMERCIAL BENEFITS

The tourist commercial benefits from railroad relocation are determined by the increased business volume accruing from hotel/gaming development in the Railroad-Commercial Street corridor. The benefits are the net increase in revenue that will result from concentrated development in the corridor instead of dispersed facilities elsewhere.

The analysis for determining these benefits is based on the following:

- The concept of critical mass in the location of gaming facilities and its effect on business volume.

- Existing and projected growth rates for hotel/gaming facilities.

The Concept of Critical Mass in the Location of Gaming Facilities

The establishment of a critical mass from "clustering" of gaming facilities has become the accepted practice of casino/hotel developers in Nevada. Experience in Reno and Tahoe has shown that when three or more casinos are grouped together in a core development, there is a synergistic relationship with a resultant significant lowering of the failure rate.

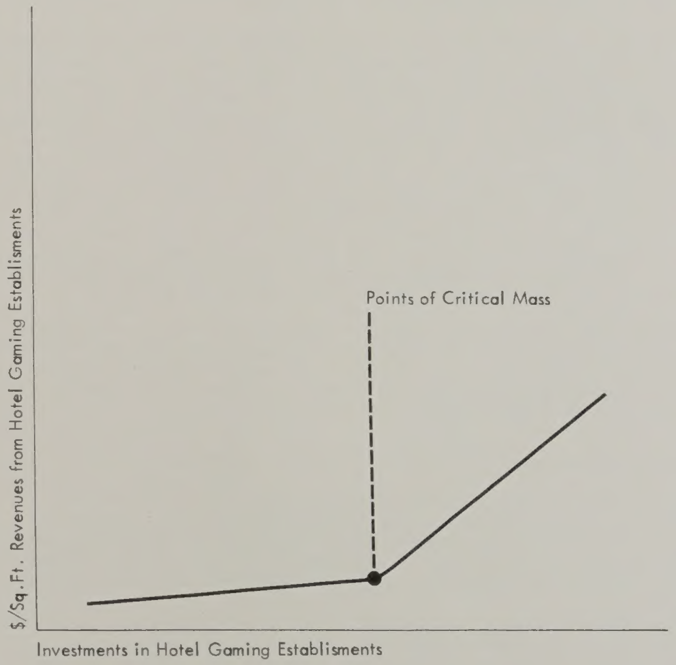
Critical mass is achieved when the sum of attractions within each facility plus the synergistic value of their interaction reaches a certain level. At this point, the total attractiveness is such that a greater proportion of the traveling public will stop than could be explained by a simple extension of investment in gaming facilities. (See Exhibit 28-1.) The value of this increased attractiveness can be measured in the dollars per square foot sales volume for three or more casinos grouped together is, on the average, greater than the same type of casinos which are located individually in strip development. The value of this clustering is not well established, but is considered to be at least between 5 percent and 10 percent of total revenues.

In applying this concept of critical mass to Elko, an analysis was made of suitable locations where a core of gaming/hotel/retail development could be located. It was concluded that any core development which did not start from the existing base of the Stockmen's and Commercial Hotels, which average over 70 percent of the existing gaming revenues in Elko, would not be economically feasible. It was further concluded that for such clustering to occur near the Stockmen's and Commercial Hotels, the existing WP and SP tracks would have to be relocated. Relocation would decrease noise, increase available parking, and, generally, provide the impetus for urban development to establish and maintain a critical mass necessary for the attraction of tourists.

Existing and Projected Growth Rates for Hotel/Gaming Facilities

Elko County Tourist and gaming revenues have been increasing at a rate of 10 percent per year for the last 10 years.* ** It is estimated that 80 percent of the County gaming revenues are derived from the City and 70 percent of the latter are attributable to the Stockmen's and Commercial Hotels.

In 1973, tourist revenues from the two establishments were estimated at approximately $7.3 million for gaming and $1.6 million for lodging and food. It is assumed that growth in lodging and food revenues for these particular types of multi-facility tourist establishments is integrally tied with increases in gaming dollar volumes. Therefore, a projected 10 percent yearly increase in gaming revenues also applied to the lodging and food facilities. It is projected that by 2001, revenues from these three tourist-related activities in the two establishments will total $25 million ($20 million in gaming facilities and $5 million in lodging and food).



28-1. CONCEPT OF CRITICAL MASS

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*State Gaming Board

**City Tax Statistics

To determine the benefit, then, for clustering new gaming hotel facilities in the Railroad/Commercial Street corridor instead of having them dispersed in strip development, the following procedure was employed:

1. Net gaming, lodging, and food revenues total $2.5 million, derived by multiplying a core growth factor of 10 percent by estimated 2001 revenues.*

2. 90 percent of this net revenue is attributed to direct employment and constitutes the tourist commercial benefit.

3. The stream of benefits are assumed to flow in linear fashion from zero dollars in 1980 to $1.25 million in 2001.

The benefits resulting from Commercial Development in the Railroad/Commercial Street corridor attributable with the Silver Street Alternative are difficult to assess. Removing the main line tracks to Silver Street from their present location in the corridor will open the area for further development as will also be the case with the North & South Bank Alternatives. However, with the Silver Street plan, development in the corridor will be exposed to noise and vibration from the Silver Street main line, and traffic disruptions on streets temporary blocked by railroad operations. These disruptions will reduce the potential for development. The concept of critical mass in gaming hotel establishments will still apply and development can be expected to congregate around the existing Stockmans and Commercial Hotels. But, this development, with the Silver Street plan, will be on a smaller scale due to reduced attractiveness, i.e. presence of train noise, vibration, and traffic congestion from the Silver Street main line.

Therefore, the benefits from commercial development which can be expected to accrue with the Silver Street Plan will be less than with the North or South Bank Alternatives. A conservative estimate of the amount of this loss is 25 percent of the Commercial benefits which could be expected if the North or South Bank plans were adopted.

FLOOD CONTROL BENEFITS

Potential flood control benefits associated with each of the plans were determined on the basis of previous flood damages estimates prepared by the U.S. Corps of Engineers, as discussed in Section 13. The damages which have been reported in the past were adjusted to reflect the more intense level of housing development now present on the flood plain and inflated costs.

It appears that Elko has been subject to flood damage on an average of once each decade. With completion of a track relocation and river rechannelization project, the damages which would be incurred during each flood year would be reduced, with the magnitude of the reduction depending upon the plans elected. The assumptions of flood control benefits for the three plans are as follows:

Alignment	Assumed Reduction in Flood Damage, Once Each Ten Years
Silver Street	$10,000
North Bank	$20,000
South Bank	$15,000

An alternative approach for estimating flood control benefits would be to estimate the cost of building a levee system of a strength equivalent to that of the proposed compacted railroad embankment. Such an approach would yield results substantially similar to those obtained by estimating the value of intermittent reductions in flood damage, as set forth above.

EMERGENCY SERVICE BENEFITS

For the 1974-75 fiscal year, the budget allotments for maintaining public emergency services were as follows:

	Total	Salary Component
City Police Department	$341,850	$276,604
City Fire Department	176,703	141,903
County Ambulance	8,500	
Total	$527,000	

In the opinion of the local fire and police personnel, the elimination of the railroad barrier will make for more efficient fire, police and emergency protection. The personnel and equipment will be more mobile, and better, more effective protection can be provided throughout the entire community without regard to aritficial geographic boundaries or barriers.

It is considered that the elimination of the railroad barrier will be equivalent to a 15 percent increase in the level or quality of emergency service, as applied to the above known yearly budget costs, or about $80,000 annually.

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*It should be noted that a survey of tourist oriented business establishments in the Railroad/Commercial Street corridor (including the Stockmens and Commercial Hotels) indicated that this growth factor is in the same order of magnitude as the projected classes in revenue due to railroad induced disruptions.

BENEFIT-COST SUMMARY

Benefit Cost Analysis

Previous sections have listed the projected flow of quantifiable benefits occurring between 1980 and 2001 that are derived from re-alignment of the railroad tracks. Project costs would be incurred during the period between 1976 and 1981, according to the following schedule:

1976-78	22% of total project cost for design, initial construction, and right-of-way acquisition.
1978-81	78% of total project cost for remaining design and construction.

The discounted project benefits and costs are summarized in Tables 28-4 and

Table 28-4

BENEFIT-COST SUMMARY Discount Rate = 10%

	Silver Street	North Bank		South Bank	
BENEFITS	Existing Yard	Existing Yard	New Yard	Existing Yard	New Yard
Railroad Operations	$ 2,120,000	$ 2,082,000	$ 2,082,000	$ 2,049,000	$ 2,049,000
Highway User Benefits					
Delays at Grade Crossing	779,000	779,000	779,000	779,000	779,000
Accident Reduction	--	154,000	154,000	154,000	154,000
Reduced Community Disruption Benefits	--	419,000	419,000	419,000	419,000
Increase in Property Tax from Yard Land	--	--	141,000	--	141,000
Tourist-Commercial Benefits	3,055,000	4,074,000	4,074,000	4,074,000	4,074,000
Flood Control	10,000	21,000	21,000	16,000	16,000
Emergency Services	473,000	473,000	473,000	473,000	473,000
(a) TOTAL BENEFITS	$ 6,437,000	$ 8,002,000	$ 8,143,000	$ 7,964,000	$ 8,105,000
COST	$ 8,035,000	$ 8,387,000	$ 9,218,000	$10,704,000	$11,715,000
Deduct "No Project" Cost	(611,000)	(611,000)	(611,000)	(611,000)	(611,000)
Resale Yard Land Credit	--	--	1,180,000	--	1,108,000
(b) Net Incremental Cost of Project	$ 7,424,000	$ 7,767,000	$ 7,427,000	$10,060,000	$ 9,996,000
Benefit-Cost Ratio = (a)/(b)	0.87	1.03	1.10	0.79	0.81

28-5. For the purpose of sensitivity analysis, two discount rates are considered in the benefit-cost analysis as discussed below.

Selection of Appropriate Discount Rate for Purposes of Analysis

The benefit-cost ratio is extremely sensitive to the interest rate on which the economic calculations are based. In this era of fluctuating interest rates, selection of an appropriate interest rate for purposes of economic analysis is difficult. Therefore, two alternative approaches have been used, as follows:

Table 28-5

BENEFIT-COST SUMMARY Discount Rate = 6.9%

BENEFITS	Silver Street Existing Yard	North Bank Existing Yard	North Bank New Yard	South Bank Existing Yard	South Bank New Yard
Railroad Operations	$ 2,904,000	$ 2,851,000	$ 2,851,000	$ 2,803,000	$ 2,803,000
Highway User Benefits					
Delays at Grade Crossing	798,000	798,000	798,000	798,000	798,000
Accident Reduction	--	281,000	281,000	281,000	281,000
Reduced Community Disruption Benefits	-- --	557,000	557,000	557,000	557,000
Increase in Property Tax from Yard Land	-- --	--	202,000	--	202,000
Tourist-Commercial Benefits	5,251,000	7,002,000	7,002,000	7,002,000	7,002,000
Flood Control	13,000	27,000	27,000	20,000	20,000
Emergency Services	661,000	661,000	661,000	661,000	661,000
(a) TOTAL BENEFITS	$ 9,627,000	$12,177,000	$12,379,000	$12,122,000	$12,324,000
COST	$ 9,039,000	$ 9,230,000	$10,370,000	$12,042,000	$13,180,000
Deduct "No Project" Cost	(684,000)	(684,000)	(684,000)	(684,000)	(684,000)
Resale Yard Land Credit	--	--	1,355,000	--	1,355,000
(b) Net Incremental Cost of Project	$ 8,355,000	$ 8,546,000	$ 8,331,000	$11,358,000	$11,141,000
Benefit-Cost Ratio = (a)/(b)	1.15	1.42	1.49	1.07	1.11

- Financing by City and State Agencies Using Tax-Exempt Municipal or State Bonds

The purpose of the proposed project, as stated in the Federal Aid Highway Act of 1973, is for demonstration, so that local governments and municipalities can explore the feasibility of undertaking track consolidation and grade separation projects in their own communities without necessarily relying on federal assistance. Since such State and local governments usually have the legal authority and the credit to issue tax-exempt bonds, the first set of economic calculations corresponds to the approximate level of recent municipal and State bond lettings. The Bond Buyer's index for the last week of August 1974 was approximately 6.9 percent, and this figure has been employed. Such an interest rate is consistent with the ongoing grade crossing elimination and track consolidation program in California, funded by a combination of State and local financial sources. The local share is frequently defrayed from the proceeds of municipal general obligation or assessment bonds.

- Federal Financing

  Under this procedure it is assumed that such municipal grade crossing elimination projects would rely primarily on Federal financing, with funds to be borrowed at prevailing rates for short-term Treasury notes, currently in the neighborhood of 10.0 percent. This is consistent with recent directives issued by the Federal Office of Management and Budget.

The results of the benefit-cost analysis are in terms of the net worth of each alternative program as of the year of implementation. Net "present worth" implies that all flows of costs or benefits are stated in terms of their present worth as of the date of expenditure of the proposed investment, which is taken as a common time base -- namely, 1976. The critical parameter involved in collapsing benefits and costs to a single year is the discount rate. In every instance the benefit-cost analysis proceeded under the assumption that the only relevant benefits were those that were directly attributable to the railroad relocation. Two cases were normally considered: (1) what would have happened under the no-build alternative, and (2) what would be expected to happen with the railroad relocation. For the former case, this would consist of extrapolating the historic trend through the planning period, and then estimating the impacts of the railroad relocation on this trend case.

Decision Matrix

While the benefit-cost analysis is designed to provide a measuring device for comparing the relative merits of alternative investments in dollar terms, it can grossly underestimate the value of a project simply by not including those benefits that cannot be expressed in economic terms. Benefit-cost analysis alone can become an artificial and rigid decision-making tool that favors only those types of projects that can demonstrate economic benefit. Such is the case in Elko.

The grade crossing elimination project through Elko was not conceived to meet the test of complete economic justification on the basis of identifiable monetary benefits alone. Rather, it must be evaluated more in the nature of a project to improve and protect the human environment, to enhance the quality of life in a small city, to prevent the decay of a central business district, to end the obvious social and economic anachronism of operating mainline railroad freight trains at grade through the heart of a business and residential district. It must also be considered in light of the substantial increases both in railroad tonnage and in vehicular traffic projected for the end of the century. These projections offer a very bleak picture with respect to the problems that Elko will face in the future if corrective action is not taken now.

In an effort to assess fairly the merits of the alternative railroad consolidation plans, a decision-making matrix was formulated to present all the factors -- both economically tangible and intangible -- that should be considered in the decision-making process:

Benefit-Cost Ratio

Environmental Impact

- topography and soils
- water resources
- air quality
- noise
- vibration
- vegetation
- wildlife
- historic sites
- archaeology
- population
- land use and displacement
- schools and emergency
- utilities
- visual quality

Community Objectives

- preventing CBD deterioration
- eliminating a divisive factor in the City
- eliminating a source for potential disaster

In Table 28-6 a value is placed on each of the above categories which describes the net effect of the given plan in that category, i.e., adverse impact, no impact, positive impact (improvement). These values reflect the findings in the environmental impact statement and serve to summarize all the impacts for the purpose of ranking the alternative plans. However, the categorization of environmental impacts serves to mask important community issues that provided the impetus for this project. Therefore, a separate, and to a degree redundant, list of community objectives is included that summarizes the various environmental, economic and social impact categories. These community issues are described below.

The blighting effect that the tracks have on the central business district cannot be too strongly stated. Unsightly wires, tracks, fences and annoying

Table 28-6

DECISION MATRIX

Impact Category	North Bank	South Bank	Silver Street	No Build
Benefit-Cost Ratio Environmental	1.10	0.81	0.46	-
• Topography and Soils	o	o	o	o
• Water Resources	-	-	o	o
• Air Quality*	+	+	o	-
• Noise*	+	+	-	-
• Vibration*	+	+	-	-
• Vegetation	-	-	o	o
• Wildlife	o	o	o	o
• Historic Sites	o	o	o	o
• Archaeology	o	o	o	o
• Population	o	o	o	o
• Land Use*	+	+	-	-
• Displacement	-	-	-	o
• Emergency Services	+	+	+	-
• Schools	+[1]	+[1]	o	-
• Utilities	o	o	o	o
• Visual Quality*	+	+	-	-
Community Objectives				
• Preventing CBD Deterioration	+	+	-	-
• Eliminating Divisive Effect on the City	+	+	-	-
• Eliminating a Source of Potential Disaster	+	+	-	-

Legend

+ positive impact on the community/affected site
- negative impact
o no impact

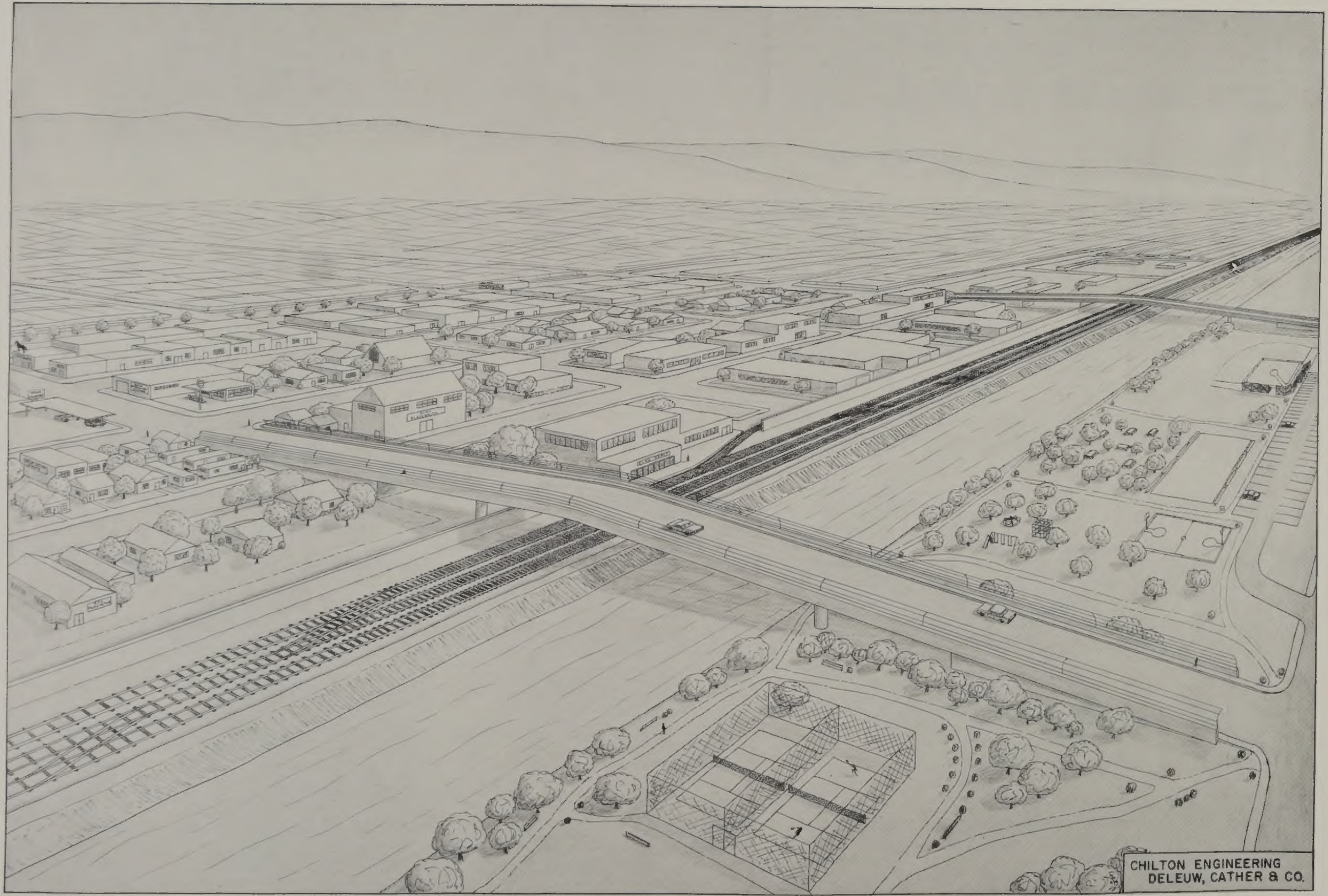
* Issue of primary concern to the community

1. With 12th Street Overpass (see Section 6)

noise and vibrations from passing trains serve to discourage new retail establishments from locating along Railroad/Commercial Streets, resulting in a movement to the north and east of the SP tracks. The community center, City Hall and other civic-related organizations have already been established outside of the CBD. If the problem of the tracks remains, the City of Elko will, in all probability, experience the type of strip and satellite shopping area development that has occurred throughout the country. The loss of a once active and viable community focal point cannot be measured in economic terms.

The railroad tracks are also a divisive factor in the City's operations when train delays, which can last up to several hours, sever all crosstown traffic -- both vehicular and pedestrian. The cost in time lost to workers, shoppers, school children, etc. of these irregular but recurring disruptions could not be computed for the benefit-cost analysis but is, nevertheless, a major community issue.

Finally, the danger of a disaster by a rail accident occuring in the midst of a CBD, e.g., due to shipment of hazardous commodities or train derailment, is very real. The potential relocation of the track to a less populated area would reduce the consequences of such an event.


CHILTON ENGINEERING
DELEUW, CATHER & CO.

Section 4(f) Statement

Draft Statement

FHWA·NV·EIS·74·OID
Submitted pursuant to the provisions of 16 U.S.C. 470(f), Section 106 of the Historic Preservation Act of 1966

Elko, Nevada, Railroad Relocation Demonstration Project

Consideration of Impacts to Southside Park

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7. Humboldt River Rechanneling
8. Air and Noise Analysis
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10. Coordination with Other Agencies
11. Section 106 - Historic Sites
12. Mitigation on 4(f) Lands
13. Agencies Contacted Regarding Relocation Project

Section 4(f) Statement

Draft Statement

SECTION 1. PROJECT DESCRIPTION

The project is located in Elko, Nevada, which, with an estimated population of 8,500 in 1973, is the largest community between Reno, Nevada and Salt Lake City, Utah. The northeastern corner of Nevada lies at the northerly edge of the arid Great Basin, described by early travellers as the "Great American Desert." It is one of the most sparsely populated areas of the continental United States.

Physically the City lies in the valley of the Humboldt River, an intrastate river which decreases in volume as it flows through the arid regions of northern Nevada until it eventually disappears into the Humboldt and Carson Sinks near Lovelock, Nevada. The Humboldt valley through Elko is oriented in a northeast to southwest direction between two roughly parallel mountain ranges. The Elko Mountain Range to the southeast rises sharply for an additional 2,000 feet above the valley floor, while the Adobe Range to the northwest ascends more gradually to about the same altitude.

Two major transcontinental railroads, the Western Pacific and the Southern Pacific, pass through the City. The Western Pacific traverses the City on a dedicated City street, Silver Street, by franchise agreement with the City of Elko. The Southern Pacific is located on the original Central Pacific right-of-way which is part Congressional land grant and part fee title. The two railroads are separated by one city block which is developed as commercial and residential properties. Both railroad alignments are located near the geographical center of Elko. Refer to Exhibit 4(f)-1.

SECTION 2. SECTION 4(f) LANDS - SOUTHSIDE PARK

The Southside Park is situated south of the present Humboldt River channel with the developed park area bounded by Water Street to the north and Seventh Street to the west, Front Street to the south and the alley between Eighth Street and Lamoille Road to the east. This area is illustrated on Exhibit 4(f)-2.

The City of Elko purchased this property from J.M. Cappriola on November 14, 1956, without any recorded deed restrictions. The City has developed this park land without any Federal assistance and has not dedicated this area as a city park. The park itself consists of 4.7 acres of which 1.2 acres is open undeveloped land, primarily used for random parking and sandlot baseball when the grass ballfield is in use.

The facilities available at Southside Park offer a variety of activities such as: a chainlink fenced softball diamond, winter ice skating pond, a small playground and a grassed green area with a small number of shade trees, and one barbeque facility.

The softball diamond is used as a practice field by one Pony League team and one Little League team. No regular games are held at this park. Season games are held near the City Park where spectator seating and lighting is available. Since the osftball diamond is accessible to the general public at all times, organization and company picnic ballgames often occur.

An old backstop is located in the undeveloped area at the Northeast corner of the park. Sandlot ball games are infrequent due to the availability of the developed field.

During the Winter season, the City maintains a 15,000 sq. ft. ice skating pond just off Front Street. This facility is a shallow, banked pond with no concessions or appurtenances. No spectator or participant seating is available.

The playground area at the park includes four swing sets, three teeter-totters, two slides, one merry-go-round push ride, and a 2-grill brick barbeque. This equipment is in fair condition, however, some repairs would be in order to the swings and teeter-totters.

Approximately thirty elm trees surround the grass open area that constitutes the greatest area of the park. This turf area fronts on Seventh Street west of the ballfield. Restroom facilities are provided in a small building between the open area and ballfield. The only drinking fountain in the park is located there also.

Detailed user volumes are not available. Park usage during weekdays is very low, according to the Park Maintenance personnel, with some usage in the afternoon by school children on their way home. The park is used by the baseball teams practicing in the evening. Weekend park usage varies greatly and no attendance counts have been made.

Southside Park is accessible from all sides. Water and Front Streets provide access from Lamoille Road and Front Street provides added access from Fifth, Sixth, and Seventh Streets. Perimeter access is provided by Front, Seventh and Water Streets, and a paved alley on the easterly side. No designated parking zones are provided, however, parking is available on the paved perimeter roads as well as north and south of the ballfield in undeveloped areas.

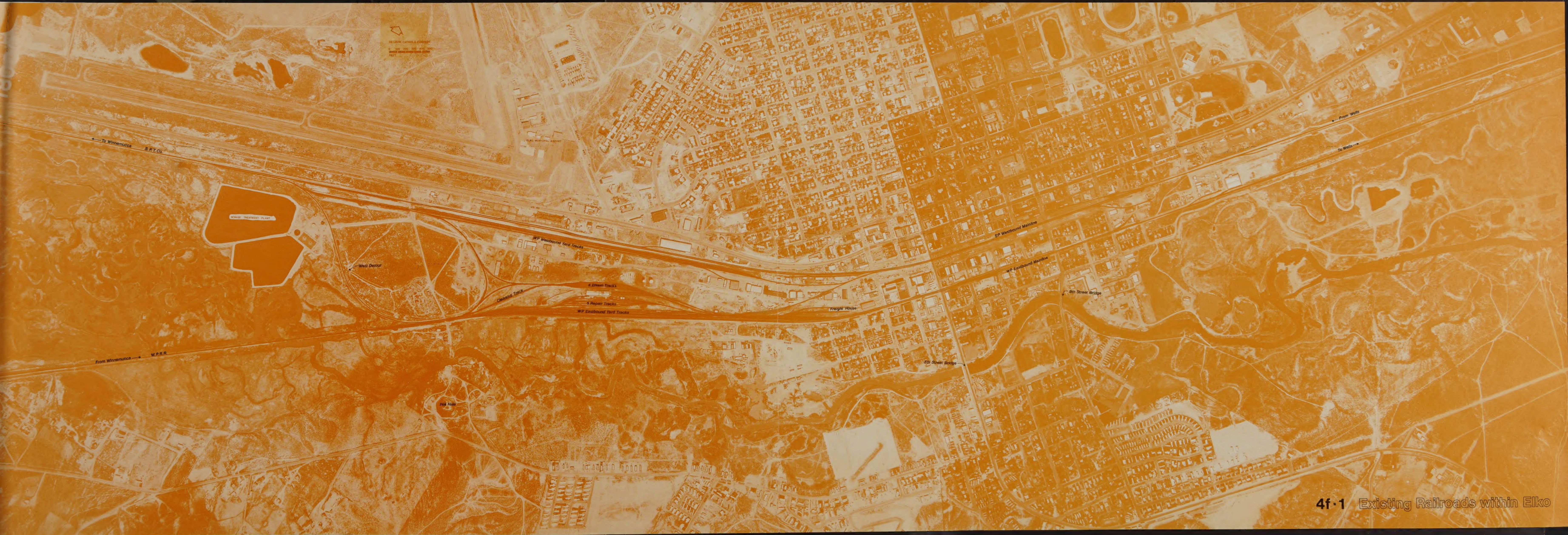
Pedestrian access is open on all sides of the parkland. There are no established paths or sidewalks in or around the park.

The park now has no unusual characteristics that would greatly enhance the value of the property. One adverse condition which reduces the value of the land is that the entire park lies in an area designated as Flood Prone by USGS Standards. In this respect, the continued use of the land as park land meets with conditions set forth in the City's General Plan.

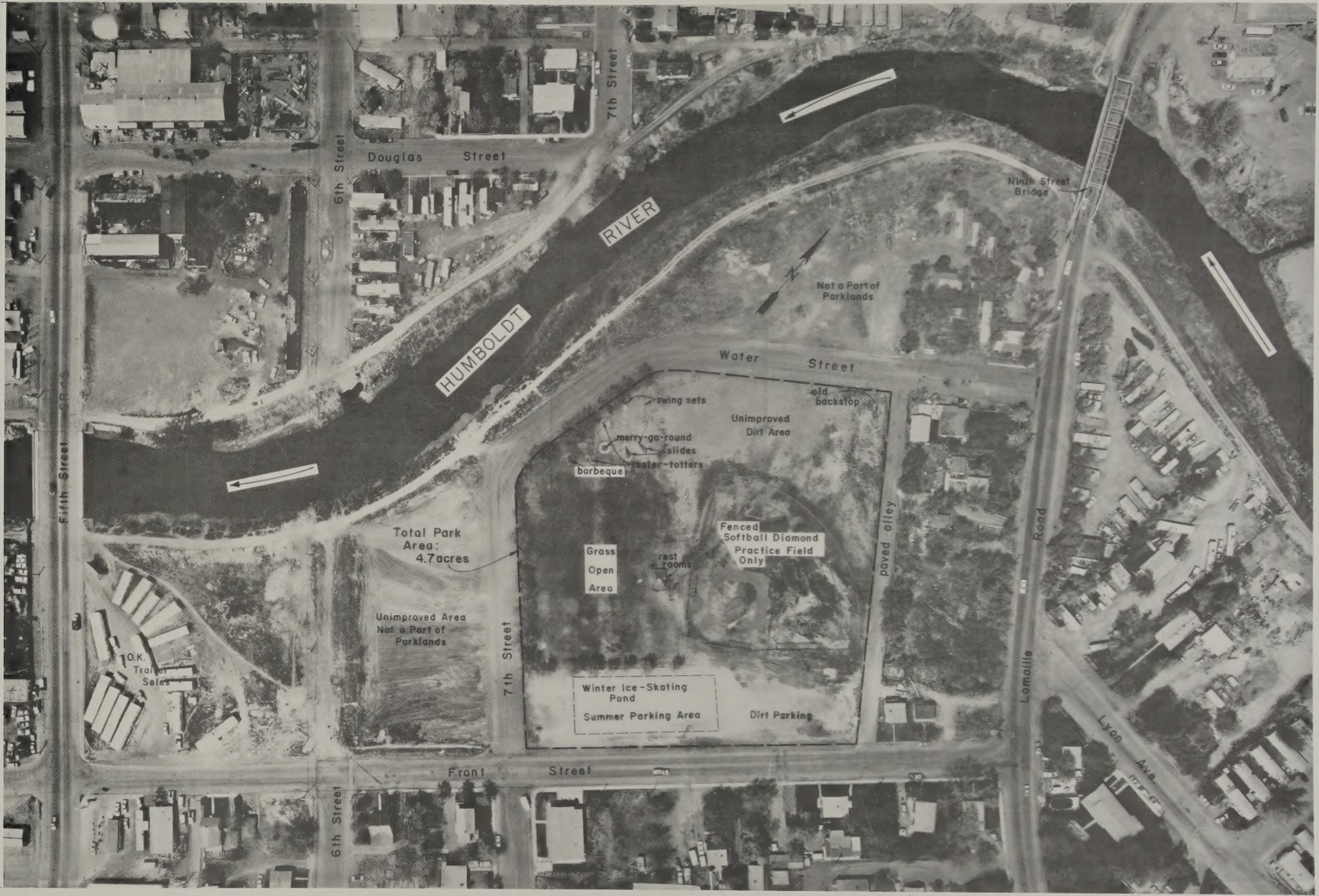
Greatest use of Southside Park occurs the first weekend of June, when the Humboldt River Run is held. The Finish Line of the race is next to the parkland.

SECTION 3. OTHER PARKLANDS IN ELKO

Elko has three other community or neighborhood parks for recreation and leisure time. These consist of the large municipal park on the east end



4f·1 Existing Railroads within Elko



4(f)·2 Southside Park

of Elko near the City Hall and proposed Civic auditorium; a neighborhood park on Sage Street in the northwest portion of Elko; and a small neighborhood park in the center of the city block between Ash and Fir Streets in the northwest portion of Elko. These parks are illustrated on Exhibit 4(f)-3.

The municipal park consists of 20.3 acres with various recreational and picnic facilities available including seven lighted tennis courts, 222 shade trees, various childrens play facilities, 22 picnic tables, ten park benches, three barbeques, six drinking fountains, a large childrens play area, a large rock garden, the Northeastern Nevada Historical Museum, several trash barrells, one maintenance building, two City well houses, a statue of an early pioneer, restroom facilities consisting of four toilets-two sinks for the gentlemen and six toilets-four sinks for the ladies, and various hedges and shrubs. Approximately sixteen acres of this area is palnted in grass. Access is off the adjoining City streets and U.S. Highway 40.

Contiguous to this park is an area of 2.7 acres which consists of a regulation lighted softball field, four sets of bleachers, one drinking fountain, an elevated announcers booth with concession stand, seven trees, and approximately one acre of parking for spectators.

Across Civic Center Drive to the north of the City park lies the Elko municipal swimming pool with an indoor pool, an outdoor pool and a small children's pool. This facility has large grass areas around it and a large off-street parking lot. This area consists of approximately 4.1 acres.

Adjacent to the swimming pool on the north side of civic Center drive is a regulation lighted little league baseball field with two dugouts, announcer's stand, scoreboard and flagpole. This area consists of approximately 5.7 acres.

A small neighborhood park is situated at the corner of Sage Street and Sewell Drive in the northwest portion of Elko. This park consists of 0.7 acres, is asphalt covered, fenced and includes various playground facilities such as slides, teeter-totters, swing sets, basketball backboards and is void of grass, trees and shrubs.

A small park exists in the geographical center of the City block bordered by A Street, Ash Street, Highland Drive and C Street. This park is accessible only through the alley way and consists of limited playground facilities, one basketball backboard, and is fenced. The park is void of trees, grass and shrubs and contains approximately 0.4 acres.

SECTION 4. SUMMARY OF EFFECTS ON SOUTHSIDE PARK

During the initial planning and conceptual stages of the relocation project, several alternative routes were identified. The alignments described earlier in this report have been selected as the only prudent alternatives that would accomplish the objectives that have made the railroad relocation project a reality for the City of Elko. The existing park system provides the City with 40.2 acres of recreational lands for a ratio of approximately 200 square feet per capita. If the Southside Park is relocated along with a recreational area along the river, the City would enjoy 50.6 acres of recreational land for a ratio of approximately 260 square feet per capita.

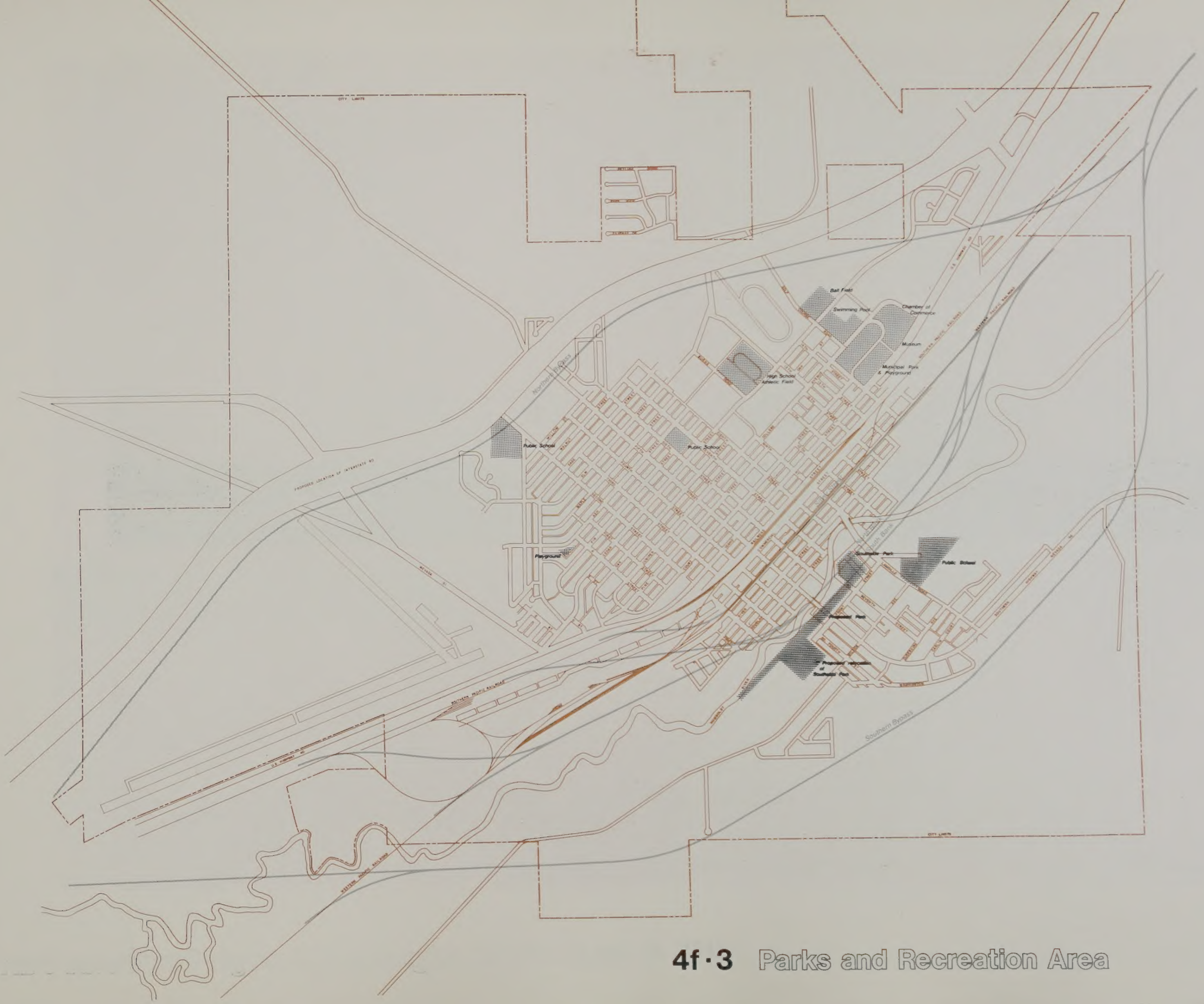
Exhibits 4(f)-4 and 4(f)-5 illustrate the alignment effects on the southside park.

SUMMARY OF EFFECTS ON 4(f) LAND

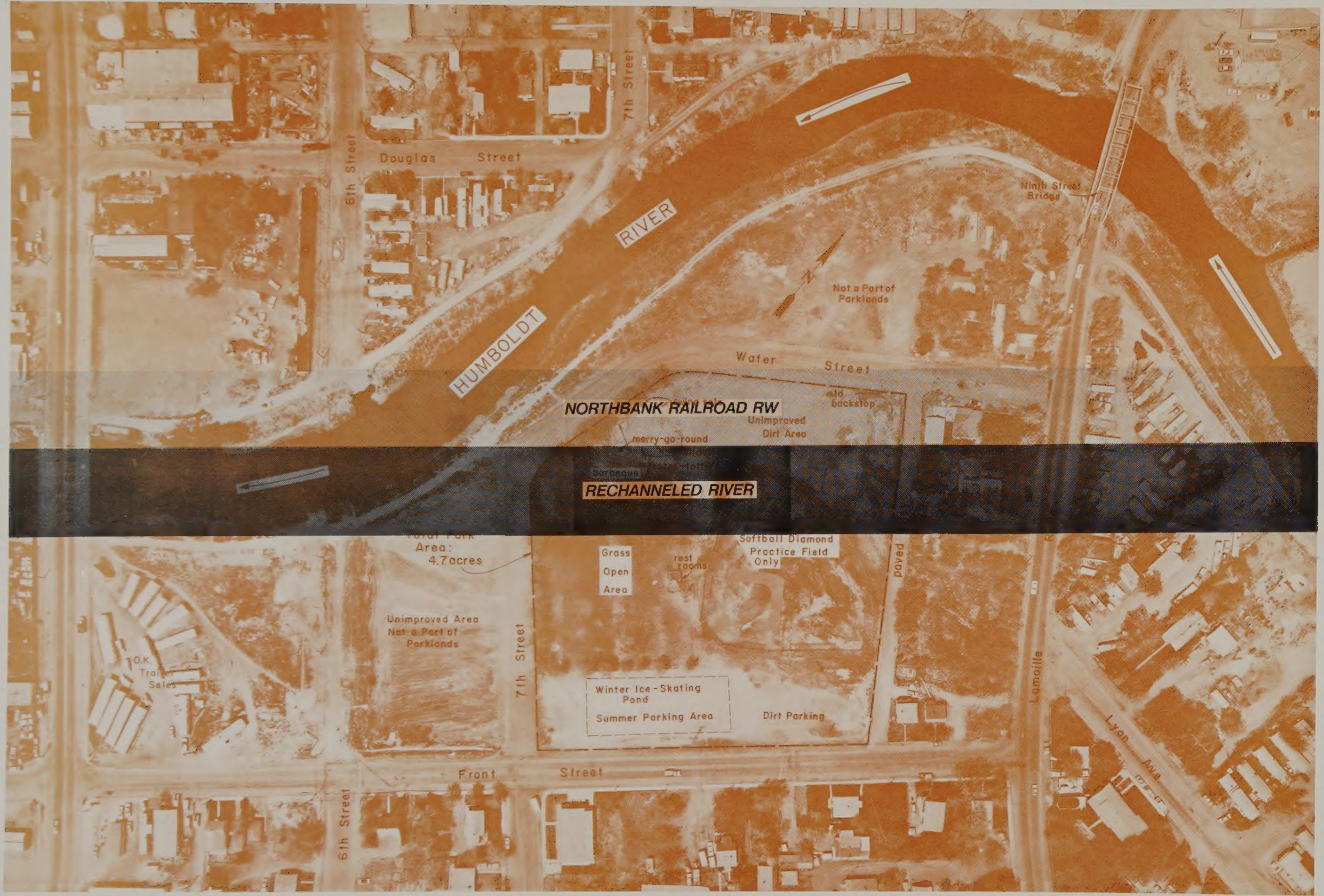
	Northbank	Southbank
Existing Parkland	4.7 acres	4.7 acres
Existing Parkland Remaining after R/W	2.3	1.1
Added Lands Between 5th & 8th Streets	4.9	2.1
Redeveloped Area Total 5th to 8th Sts.	7.2	3.2
Net Increase or Decrease	+2.5	-1.5
Existing Facilities Relocated or Removed	Ball park Playground Restrooms	Ball park Playground Restrooms Open area
Access	Front St.	Front St.

SECTION 5. ALTERNATIVE ALIGNMENTS AND 4 (f) LANDS

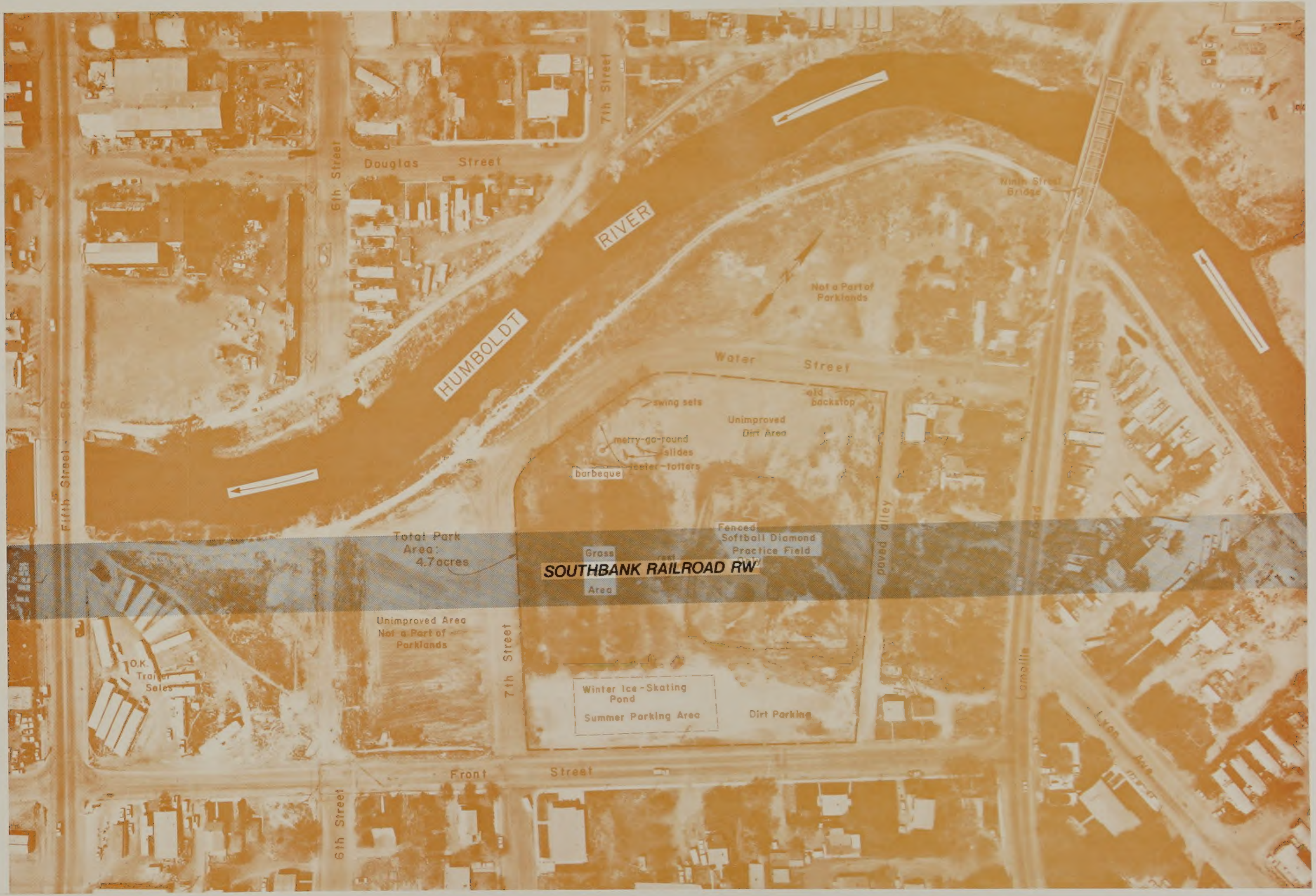
The northerly bypass, Silver Street alignment, Do Nothing alternative and the Southern Bypass alignments do not involve any Section 4(f) lands. The northbank alignment with river rechannelization and the southbank alignment involve a section of City land which has been developed and utilized as a neighborhood park. This area is commonly referred to as the Southside Park and functions primarily as a gathering place for local residents since it is away from major highways and thoroughfares.



4f·3 Parks and Recreation Area



4(f) · 4 North Bank Alignment through Southside Park



4(f)·5 South Bank Alignment through Southside Park

SILVER STREET PLAN - CONSOLIDATION OF BOTH RAILROADS ALONG PRESENT WESTERN PACIFIC RIGHT-OF-WAY

This plan calls for the Western Pacific main line to remain in its present position in Silver Street, for Southern Pacific to be relocated parallel to Western Pacific on the north, in the space now occupied by WP's so-called "Old Main Line" (very light, old 85 pound rail), and a new lead track between the main lines.

This plan appeared worthy of detailed examination, detailed cost estimates were prepared, the advantages and disadvantages were evaluated, and the plan has been discussed with representatives of the railroads and of the community.

NORTHBANK ALIGNMENT

This plan includes an integrated multi-purpose corridor along the northbank of the Humboldt River, with a linear park, a flood control channel, the relocation and consolidation of both railroads, and relocation and development of the present Southside Park.

The railroads on the north bank of the river would be separated longitudinally from the channel by a maintenance roadway and levee, which could be used jointly by flood control and by railroad maintenance vehicles.

For many years the US Corps of Engineers has contemplated an upstream flood control project on the Humboldt River, involving reservoirs and channel improvements. Because maximum floods on the order of 7000 cfs must be accommodated, some channel straightening and deepening through Elko, and a cut-off through a major horseshoe bend, will be necessary to pass flows of this magnitude, but a fully lined concrete channel is not planned. The typical section for the revised river channel includes a defined river channel adjacent to the north bank and a flood overflow area along the south side of the river.

The flood overflow area along the south bank of the channel is to be devoted to recreational use as a redeveloped Southside Recreation Area.

The existing Southside Park facilities affected by the northbank alignment includes displacement of usable playground area and approximately one-third of the open turf area, the relocation of the softball diamond, and the relocation of the restroom facilities.

The winter ice pond would not be disturbed and over half of the open area would remain.

SOUTHBANK ALIGNMENT

The southbank alignment is very similar to the northbank alignment except that it crosses the Humboldt River in the vicinity of 11th Street extended passes directly through the Southside Park, crosses the Humboldt River in the vicinity of First Street and then connect to the present Western Pacific yard.

As the track alignment moves south, more of the park land is affected. The Southbank alignment leaves only 1.1 acres of the existing park unchanged.

Affected facilities include the playground, open area, ballfield and restrooms. Of the existing facilities only the winter ice pond would remain.

Access to the park would have to be developed from the north, since the railroad would eliminate the southerly access provided by the other proposed alignments.

NORTH BYPASS - RELOCATION FOLLOWING INTERSTATE 80, AROUND NORTH LIMITS OF ELKO

This plan would relocate both of the railroads in the median or directly southerly of the Interstate 80 bypass, which will bypass Elko to the north. This plan was rejected for several technical reasons, the most compelling of which were:

- Maximum grades of up to 2-2½ percent would be required, which would be entirely unacceptable for main line rail operations. Grades in excess of one percent are the maximum permissible for the Western Pacific.
- It would still be necessary to maintain numerous switching leads and tracks to serve various industries in Elko.
- This plan would separate Western Pacific from its Elko yard. Since the operation of trains into stub-end yard would be inefficient and impractical, a new substitute yard at some alternative location would have to be constructed. The cost would be prohibitive.

DO NOTHING

This alternative assumes that the tracks would not be consolidated, and that each railroad would remain on its present separate alignment through Elko. However, it must be recognized that static conditions cannot exist indefinitely in an ever changing world, and certain minimum inescapable capital expenditures and improvements will inevitably be required over the next few years, such as:

- Installation of automatic gates
- Replacement of existing Ninth Street Bridge
- Extension of Western Pacific Yard

This alternative would increase the delay, accident rate, and operating costs of vehicles and railroads to a point intolerable and unbearable in the near future.

SOUTH BYPASS - RELOCATION TO THE SOUTH OF ELKO CITY LIMITS

This plan would relocate the railroads to the south of the City of Elko. This plan is not feasible for the following reasons:

- The southern area is mountainous and would require excessive railroad grades.
- This plan crosses the Humboldt River and flood plain twice, creating either two long structures or foundation protection and stabilization.
- The WP would be separated form its present yard.

SECTION 6. COMMUNITY GOALS

The General Plan of the City of Elko, adopted in January, 1974, calls for perpetuation of lands south of the river and relocated railroad, and north of Front Street as park lands or open spaces.

Community Development Goals in the General Plan provide: "That the City endeavor to protect critical environmental areas . . . That areas not suitable for residential, industrial, commercial or public building because of soil, drainage or topographic considerations be avoided for such development." Since the area under consideration lies in the Flood Prone Area determined by USGS it naturally falls into an open space or parkland designation for land use planning.

The following Community Facility Goals as outlined in the General Plan set goals and objectives which the area under consideration can fulfill:

GOAL 2: That more area parks be scattered throughout the City.

Objectives: That all residential areas include land set aside for area parks with complete facilities -- both indoor and outdoor -- for children, teenagers, and the elderly; and that subdividers be required to provide these facilities whenever practicable in accordance with State law.

That park and recreation standard be developed for Elko and implemented.

GOAL 3: To provide a full range of recreational facilities within the City's ability to find suitable locations for such facilities and within the City's ability to provide financing.

To provide more tennis courts.

To provide additional swimming facilities.

To provide roller and ice skating rinks.

To provide specific areas for:

Horseback riding
Snowmobiling
Flying model airplanes
Bicycle routes
Motorcycling
Drag Strips
Trap shoot

That specific stnadards for numbers, sizes and locations be investigated for the above facilities and that such facilities be be indicated in the General Plan, if they prove feasible.

In addition to Community Development Goals, the General Plan divides the planning area into sections, outlining the proposed functional elements of each area. The following excerpts cover the area of the present park land and outline the future development goals of the City in the area under consideration:

AREA BOUNDED BY US-40, EAST LIMIT OF CITY, SR-46, FIFTH STREET

Community Facilities:	Add playground-park east of Panorama Mobile Homes; preserve and protect flood plain of Humboldt River.
	Add bicycle trail to area along river and connect with mobile home and single family areas. Connect also with a new arterial street which will lead to bike route along present railroad tracks.
	Expand Southside Elementary School.
Transportation:	Arterial streets (already constructed) -- US-40, SR-46, Fifth Street.
	Arterial street to be built -- SR-46 -- US-40 connector, including bridge over Humboldt and bike trail on west side of road. (Alternate alignment to US-40 east of shopping center.) Arterial to be built -- 8th Street and bridge over Humboldt River.

Relocate Southern Pacific and Western Pacific railroad tracks, including rechanneling of Humboldt River and construction of new bridge.

Build 8th Street bridge over Humboldt River.

Collector streets (already existing) - Wilson Avenue, Lamoille Road.

AREA BOUNDED BY US-40, FIFTH STREET, SOUTHERN LIMIT OF CITY, WESTERN LIMIT OF CITY

Community Facilities: Add playground park in Humboldt flood plain; preserve and protect flood plain of Humboldt River; include swimming facilities and school for grades 1, 2, 3. (Build pool and school out of flood plain.)

Add bicycle trail to area along river and connect with mobile home and single family living areas; connect with Hot Hole.

The significance of Southside Park has been shown by the considerations and planning that have entered into the General Plan with respect to neighborhood recreation areas. Although the park has not been developed to any great extent, the future of the area as an outdoor recreation corridor, primarily for local residents, is an important feature of the railroad relocation project. Elko's City Fathers have recognized the usefulness of the area, not only for recreation, but also as an added buffer between railroad alignment and residential zone, and for use as a flood protection area. This flood protection is to be incorporated into channel realignment to prevent a box-like trapezoidal channel and to incorporate the river bank into the useful park area.

Land parcels necessary for the initial expansion and development of Southside Recreation Area are to be purchased by the City during their acquisition of the right-of-way for railroad relocation and river rechanneling.

The area selected for the relocated Southside Park is an undeveloped area approximately one and one-half city block west of 5th Street, south of the Humboldt River and contiguous to the proposed strip park area west of the river/railroad grade separation at 5th Street. Access to the area would be along Front Street extended westerly and south Third Street. The new park would consist of approximately 5.2 acres with City utilities readily available and is still located near the geographical center of the populated southside area. This location has good access and would continue to serve as a neighborhood park to the people in the immediate area.

SECTION 7. HUMBOLDT RIVER RECHANNELING

The existing quality of the Humboldt River does not meet the State Standard for recreational waters. The altering of the channel has been studied and projections have been made by the Nevada Fish and Game and Dr. David N. Emerson, which indicate any disruption to the river system will be minimal and will probably adjust to a normal state by a seasonal period of time.

At the present time there are only a few recreational activities which the Humboldt River will support, namely, the annual river run and fishing for Catfish and Carp. The section of river proposed for rechanneling frequently dries up or carries a minimal flow. Therefore, the rechannelization would not disrupt to a significant degree any existing recreational activities and may enhance future recreational use of this area.

SECTION 8. AIR AND NOISE ANALYSIS

AIR POLLUTION - EXISTING CONDITIONS

Elko has a relatively clean air environment which has temperature inversions only two or three days a year which could trap pollutants. Afternoon winds in the spring and summer have a "cleaning" effect as they blow through the valley. Dust aloft can limit visibility but particulate levels are rarely so high.

Particulate matter consists of dust, mist, ash, smoke, and fumes. Natural particles consist of dust and pollens. However, in industrialized area, man-made varieties such as smoke from fuel-burning vehicles, pulverized materials such as cement, and lead from automobile exhaust predominate.

Field data on air quality is limited for Elko. The data show particulate levels during 1971, 1972 and 1973 that exceed Nevada's Ambient Air Quality Standards for geometric mean of suspended particulates (60 micrograms per cubic meter) and for 24-hour maximum for suspended particulates (150 micrograms per cubic meter).

AIR PARTICULATE LEVEL

	Geometric Mean % excess over AAQS*	24-Hour Maximum % excess over AAQS*
1971		
1971	10%	5%
1972	0%	0%
1973	6%	52%

---

*Ambient Air Quality Standard

The Nevada Standards are more stringent than Federal Standards. The Federal Geometric Mean is 75 micrograms per cubic meter. The 24-hour maximum is 260 micrograms per cubic meter.

The air does not become contaminated from sources outside of Elko, since it is lcoated far from large pollutant sources (i.e., industrial cities, complex freeway interchanges). Even within Elko, there are relatively few polluting industries.

PROJECTED AIR QUALITY IMPACT

Assumptions

The speeds will be increased along the mainline track for both Western Pacific and Southern Pacific trains. Since Western Pacific trains must stop at the yard, westbound trains must slow down as they approach the yard and eastbound trains accelerate rather slowly as they depart from the yard. The Western Pacific speeds will be less than the Southern Pacific train speed.

The pollution levels along the mainline track should decrease slightly at the higher speed and throttle setting. Once a turbocharged engine is put into throttle position No. 6 (the highest would be No. 8), it is driven by exhaust gases which greatly reduces the pollutant emissions.

The pollution levels due to automobiles should not change as the present traffic is governed by the same City speed limits as the future would be.

If the park is relocated to its proposed position, the amount of traffic affecting may be decreased due to elimination of traffic from Lamoille Road.

NOISE POLLUTION AND ABATEMENT

The levels of noise pollution now existing and what is projected to occur in the relocated Southside Park is very similar, if not reduced. The new park location is approximately the same distance from the new alignments as the existing park is from the present alignments. There will be a reduction in noise levels due to planned abatement devices, such as earth dikes or retaining walls, and the elimination of the horn blowing.

SECTION 9. MEASURES CONSIDERED TO MINIMIZE HARM

The harm done to the city park system and the neighborhood park will be minimized by relocation of the park to an area out of the flood plain, further away from the railway alignments, centralized to the expanding southside area and providing an increase in the amount of parkland per capita to the citizens of Elko.

The new park will include equal or better replacement facilities, landscaping, lighting for night use by neighborhood ball teams and a more centralized area for use.

The new park would be constructed prior to constructing the new alignment in order to minimize disruption to the users. This will be necessary to facilitate landscaping due to the short growing season (average of 90 days) in the northern Nevada area.

PLANNED FACILITIES

A land use corridor including the railroad tracks, the Humboldt River and parklands has been proposed to meet the Community Goals as well as to replace any property taken from the present Southside Park for railroad or river right-of-way.

Development of Southside Recreation Area is to include the following proposed facilities:

- Sports Complex; to include ballfields, tennis courts, multiuse courts for basketball, skating, etc., and a large open turfed area for touch football, soccer, etc.
- Family picnic sites along the river and proposed lakes.
- Group picnic area with shelters, large barbeque and slab for dancing.
- A lake to be constructed separated from the River (material used for railroad embankments). Possible uses include boating, fishing, and duck feeding areas.
- Pathways for foot traffic and bicycles.
- Play equipment areas for both tots and older children.
- Natural area for possible use as an environmental study area.
- A "Roadside Rest" type area for tourists to relax in while eating, cooling off, etc.
- An outdoor amphitheater for concerts, rallies, etc.
- Parking facilities located throughout the park to serve the visitors.
- Extensive landscaping.

Plans for the river park area do not foresee construction as a single project. Development could be phased over several years, as funds become available.

Development of the parkland corridor along the railroad and river is one of the added benefits of the railroad relocation project. Design features such as incorporating the river bank into the parklands rather than having a levee between park and waterway, reducing traffic volumes in and around the park area, and expanded recreation facilities enhance the park.

As previously noted, the present facilities will be improved and perpetuated.

Construction in the immediate area for river rechanneling may temporarily prohibit the use of the park for the safety of the public. However, river rechanneling would be undertaken late in the year when river flows are minimal. This corresponds with the season of the year when park usage is minimal. If construction extends into winter, there are many open areas where temporary ice ponds could be provided for winter recreation within a short walking distance from the existing pond.

The overall project effect on park users will be to increase the area of the parkland, provide a greater variation in available activities, and thereby attract a greater number of people to that neighborhood park. This development will not only benefit the Southside area, but will also decrease the local user volume at the major City Park, making those facilities next to the highway more available to tourists and other visitors.

SECTION 10. COORDINATION OF 4(f) ACTIVITIES WITH OTHER AGENCIES

The re-establishment of the Southside Park and increased parkland to be constructed has been reviewed with the Bureau of Outdoor Recreation, Nevada State Fish and Game, Nevada Division of Environmental Health, Nevada Environmental Commission and has received the approval in principle of the people contacted.

The City of Elko is the legal entity which has jurisdiction over the Section 4(f) lands. The City has known the project would disrupt the southside park from the outset and has supported the project and the relocation of the park, if necessary. The citizens in Elko are aware of the project's effect on the Southside Park and the project enjoys widespread support from the community.

SECTION 11. SECTION 106 - HISTORIC SITES

A thorough investigation of the project area was conducted by utilizing the Northeastern Nevada Museum in Elko, the Nevada State Museum from Carson City, the Nevada Archeological Survey, and the Nevada Historical Society. The project was reviewed by the State Historic Preservation Officer and a "no effect" report was given.

The project alignments do not physically affect any historical structures listed in the National Register of historic sites or any sites worthy of incorporation into the Register.

Refer to the Appendix for documentation from the Agencies involved.

SECTION 12. MITIGATION ON 4(f) LANDS

The effect the Elko project has on the Southside Park necessitates the rehabilitation of a southside neighborhood park if one of the northbank or southbank alternatives is selected. The proposed relocation area is able to hold replacement facilities and is situated in an area that will allow the park to remain essentially a "Southside Park." The new location would offer park facilities across the river from the proposed lake area to be created by excavation for project materials.

The park could be physically missed with the Northbank alignment by not rechanneling the river and construction of two railroad-river crossings. This would not reduce the right-of-way requirement or relocations since the properties involved are severely hit by the railway alignment.

The costs associated with relocation and rehabilitation of the park are estimated at $75,000, whereas, the costs of construction of two major rail-river crossings are estimated at 4.3 million dollars.

Therefore, the new park will not only serve to replace the existing park, but will also prove economical to the project.

SECTION 13. AGENCIES AND INDIVIDUALS CONTACTED REGARDING RAILROAD RELOCATION

The following list includes the Agencies and Organizations which have been contacted. Many local businessmen in Elko have also contributed information to this report.

A. Federal Agencies

Council on Environmental Quality
Environmental Protection Agency
Department of the Interior
Department of Commerce
Department of Army
Department of Agriculture
Department of Transportation
Department of Health, Education and Welfare
Department of Housing and Urban Development
Advisory Council on Historic Preservation

B. State Agencies:

- Comprehensive Health Planning
- State Planning Board
- Conservation and Natural Resources
- Fish and Game
- Nevada State Highway Department
- Department of Commerce
- Department of Economic Development
- Employment Security Department
- State Clearinghouse (OMB A-95)
- Public Service Commission
- Nevada State Museum
- Nevada Historical Society

C. Other Agencies and Organizations:

- Sierra Club
- Nevada Archeological Survey
- Northeastern Nevada Museum
- Foresta Institute
- Nevada State Heritage Association
- Desert Research Institute
- Stanford Research Institute

D. Local Agencies, Organizations and Businesses:

- Elko City Council
- Elko County Commissioners
- Elko County Sheriff
- Elko Police Department
- Elko Fire Department
- Elko Ambulance Service
- Elko County School District
- Elko County Welfare
- Elko County Assessor
- Union Federal Savings & Loan
- First Western Savings
- Elko Planning Commission
- Elko Daily Free Press
- Elko Independent

E. Utilities and Railroads:

- California-Pacific Utilities Company
- Southwest Gas Company
- Nevada Power Company
- Western Pacific Railroad Company
- Southern Pacific Transportation Company

L. L. STENOVICH, Mayor
JOHN M. SUTHERLAND, City Manager
DOROTHY CORTA, City Clerk

JOHN F. SMALES, City Engineer
DENNIS PETERSEN, Building Inspector

CITY OF ELKO
1751 College Avenue
ELKO, NEVADA 89801

October 23, 1974

Ira S. Rackley, P.E.
Project Engineer
421 Court Street
Elko, Nevada 89801

Dear Ira,

As per our phone conversation, the following information is being submitted for stating the City's position on developing and maintaining a soutside city park in event of a Railroad Relocation corridor location being picked which will affect the existing park located between 6th Street and Lamoille Road and along the southbank of the Humboldt River.

The southside park functions as a small neighborhood park for citizens residing in the southern area of Elko. It is the City's position that the relocation of the tracks is of paramount importance to the survival of Elko and the establishment of orderly development. The City and Railroads have worked together towards this end and the City shall stand on the importance of the track relocation to the entire community and the value of the southside park to the residents of that portion of the city.

This particular park has never been dedicated as a City Park but was developed as people began using the open area for recreation. This use through the years lead to establishing the facilities as they now exist. The City automatically assumed maintenance as a public service and the City shall continue to serve in this capacity.

The proposed north and south bank alternative alignments will adversely affect the park as it now functions but the replacement facility along with the track reloca=tion would provide a much greater benefit to the City than leaving the tracks in their present location only to save the present park. After reviewing the data collected, it would appear the only other alternative would be to leave the tracks in the downtown area, consolidated on Silver Street and this would not satisfy the demonstration project congressional directive or the city and railroads desires.

The City of Elko has developed the existing park without Federal Aid and it is the full intention of the City to replace the existing park and maintain a new park with equal or better facilities, if the Railroad Relocation Project location makes this necessary. A probable location, as shown in the project plans for the park and riverfront development, is satisfactory with the City of Elko.

The City, therefore, is very much in favor of doing whatever is necessary to further this project towards its intended goal.

Very truly yours,

Jack Sutherland

Jack Sutherland
City Manager

L. L. STENOVICH, Mayor
JOHN M. SUTHERLAND, City Manager
DOROTHY CORTA, City Clerk

JOHN F. SMALES, City Engineer
DENNIS PETERSEN, Building Inspector

CITY OF ELKO
1751 College Avenue
ELKO, NEVADA 89801

December 20, 1974

Mr. Ira S. Rackley, P.E.
Project Manager
421 Court Street
Elko, Nevada 89801

Dear Ira,

The City has reviewed the effects of the northbank and southbank alignments on the Southside Park and, as stated in my letter of October 23, 1974, finds no feasible or prudent alternative to the relocation of the Southside Park. In fact, we support its relocation and replacement of facilities when ever it becomes necessary.

The City will relocate to the replacement parcel all existing facilities which now exist in the Southside Park. These generally include a chainlink fenced softball diamond with backstop; winter ice skating pond; planting of grass, trees and shrubs; installation of a lawn irrigation system; erection of restroom facilities better than the ones now existing; barbeque and picnic facilities; and, in the long range plan, possibly lighting the ball field for night intercity games.

The City feels the relocation of the park will enhance its use and provide the citizens of Elko with a facility they can use whenever they want. As it now exists, the park is subject to flooding and damage from these floods. The relocation will eliminate this inconvenience and cost.

Very truly yours,

CITY OF ELKO

Jack Sutherland

Jack Sutherland
City Manager

March 3, 1849

IN REPLY REFER TO:

M2253

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
PACIFIC SOUTHWEST REGIONAL OFFICE
BOX 36062
450 GOLDEN GATE AVENUE
SAN FRANCISCO, CALIFORNIA 94102

December 17, 1974

Mr. Ira S. Rackley
Chilton Engineering
CDXXI Court
Elko, Nevada 89801

Dear Mr. Rackley:

We have reviewed your preliminary draft of the Section 4(f) statement for the proposed relocation of the Southern Pacific and Western Pacific railroads in the City of Elko, Nevada. The proposed project was also field inspected with you by Mr. James Huddlestun, of our staff, in August 1974.

The following are our comments on your preliminary draft:

1. There appear to be no feasible or prudent alternatives to the taking of a portion of the City's Southside Park. In this respect, we favor the use of the northbank alignment as it has the lesser effect on the park and would provide for more additional parkland.

2. We recommend that the statement contain a letter from the Elko city manager stating his concurrence and/or suggestions on the proposed park replacement and enhancement measures.

3. The statement should indicate which recreation facilities, of those affected in the existing Southside Park, will be relocated to the replacement parcel. Also, a description of proposed new facilities should be provided.

The above comments are preliminary in nature and represent the views of this Bureau only. We appreciate the opportunity to assist in your project planning and review this preliminary statement.

Sincerely yours,

Frank E Sylvester

Frank E. Sylvester
Regional Director

CONSERVE
AMERICA'S
ENERGY

Save Energy and You Serve America!

Appendices

APPENDIX 1. ENVIRONMENTAL CONSIDERATION, GEOLOGY & RELATED ASPECTS. PREPARED BY J. J. HUSBAND, NEVADA STATE HIGHWAY DEPARTMENT

2A. HISTORICAL FLOODS ON THE HUMBOLDT RIVER

2B. WATER QUALITY ANALYSIS OF THE HUMBOLDT RIVER DURING FLOW, CHILTON ENVIRONMENTAL LAB.

3A. A LIMNOLOGICAL SURVEY OF THE HUMBOLDT RIVER, JUNE, 1974. PREPARED BY DAVID N. EMERSON, PhD.

3B. A LIMNOLOGICAL SURVEY OF THE HUMBOLDT RIVER, PART II, JULY - AUGUST, 1974. PREPARED BY DAVID N. EMERSON, PhD.

3C. PLANTS AND ANIMALS INDIGENOUS TO THE RAILROAD RELOCATION PROJECT AREA

4A. AIR QUALITY CALCULATIONS

4B. NOISE DATA & METHODOLOGY

4C. VIBRATION MEASUREMENT METHODOLOGY

5. HISTORIC REPORT. PREPARED BY VICTOR GOODWIN

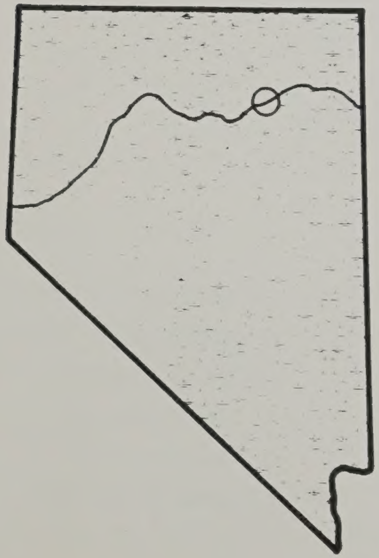
Appendix 1

NEVADA STATE HIGHWAY DEPARTMENT

ENVIRONMENTAL CONSIDERATIONS
GEOLOGY AND RELATED ASPECTS

CITY OF ELKO
ELKO COUNTY
NEVADA

AUGUST 1974



ENGINEERING GEOLOGY & FOUNDATION SECTION
MATERIALS & TESTING DIVISION

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2. Geologic Map
3. Soils and Vegetation
4. Erosion Potential
5. Land Productivity
6. Foundation Conditions

INTRODUCTION

PURPOSE AND SCOPE

During the next year the proposed railroad relocation and alignment of Interstate 80 in the vicinity of Elko, Nevada will be considered for their impacts on the environment. In conjunction with these studies the Engineering Geology and Foundation Section herein gives consideration to the geology and related aspects of the physical environment of the Elko area.

The following study was compiled by an Engineering Geologist from the available literature, a photogrammetric reconnaissance, and a field review. The report will discuss the geology, surface characteristics, and foundation conditions which may affect or be affected by the proposed transportation projects.

LOCATION

The study area centers around the city of Elko which lies in the west central portion of Elko County in northeastern Nevada. The maps of the area which accompany this report have been compiled on a scale of 1:24,000 and encompasses about 17 square miles of township 34 north, range 55 east. The study area trends in a northeasterly direction bound on the east and west by the proposed Interstate 80 project and on the north and south by topographic and economic restrictions. The plates included with this report show the proposed alignment of Interstate 80 and the proposed north bank alignment of the railroad. The two other proposed railroad alignments were not shown.

These are the south bank alignment which is the same as the north bank alignment except between First Street and Ninth Street where it parallels the south side of the river, and the northern alignment which roughly parallels the proposed interstate.

PHYSIOGRAPHY

The city of Elko lies along the Humboldt River in a narrow southwestward trending valley formed by the frontal faulting of mountain blocks characteristic of the Basin and Range Physiographic Province. The Humboldt River flows from the northeast, southwestward through the study area. To the north of the river, northwest trending hills rise toward the Adobe Range about six miles north of Elko while the Elko Hills rise abruptly south of the river. Relief in the study area varies from about 5,000 feet along the Humboldt River to about 5,600 feet on a peak in section 28. Relief in the valley rises to about 7,400 feet in the Adobe Range and about 7,500 feet in the Elko Hills. The basic relief and features of the study area are shown in Plate 1.

GEOLOGY

STRATIGRAPHY

The geology of the Elko area was first mapped by J. P. Buwalda (Winchester, 1923) and later mapped in a general manner by A. E. Granger and others (1957). Field review of these maps revealed discrepancies and a lack of detail. Consequently, the area was remapped as shown in Plate 2. In order to facilitate later discussions the Tertiary deposits were separated into three units, while future maps of this area may combine these as one. The five stratigraphic units of the study area are shown in Plate 2 and are described below beginning with the oldest exposed unit.

CARBONIFEROUS (?) QUARTZITE:

This unit is a very hard, massive, and poorly jointed quartzite. The rock is believed to be of Carboniferous age but until more regional geologic mapping is conducted the stratigraphic name and age will be uncertain.

LOWER TERTIARY SEDIMENTS AND RHYOLITIC TUFFS:

This unit is shown on Plate 2 as an area of undifferentiated lower tertiary lake sediments and rhyolitic tuffs. The lake sediments consist principally of shales, including oil shales, with thinner strata of poorly consolidated clays, silts, sands, gravels, and rhyolitic ash. The beds dip in a northerly direction and overlie rhyolitic tuffs which may be of late Cretaceous age.

LOWER TERTIARY SEDIMENTS:

These sediments are the same as those previously described with fewer shales and some unconsolidated clastic material. The area marked as this unit does not expose any rhyolitic tuffs.

UPPER TERTIARY SEDIMENTS:

These lake sediments consist mainly of unconsolidated clays, silts, and rhyolitic ash with subordinate strata of poorly consolidated sands, gravels, and shale. Unlike the lower Tertiary deposits, these beds dip to the south and east.

QUATERNARY SEDIMENTS:

This unit consists of unconsolidated clays, silts, sands, and gravels deposited by the meandering and flooding of the Humboldt River. The clays and silts are usually found in present and ancient oxbow lakes and flood plain marshes, while sands and gravels were concentrated along oxbow banks and in scour deposits. Consequently the sediments are discontinuous both laterally and vertically.

GEOLOGIC STRUCTURE

The present character of the region is the result of Basin and Range block faulting which began during the Oligocene about about 26,000,000 years ago and has continued to the present. John Sales (1966) describes the principal tectonic controlling force of basin and range formation and structure as wrench faulting parallel with the San Andreas fault of California. Such northwest trending shears create north and northeast trending tensional areas. These tensional areas form a characteristic "S" or reverse "S" pattern along which major physiographic and structural features appear to parallel. In order to relieve the tensional areas major normal faulting (block faulting) has occurred, creating the present day north and northeast trending basins and ranges of Nevada.

Within the region major structural right lateral shears truncate the northern end of the East Humboldt and Adobe Ranges and the southern end of the Ruby Mountains and the Sulfur Spring Range. The primary tensional forces resulting from these shears has caused the major northward trend of the major topographic features.

In the study area the valley trends in a northeasterly direction. This eastward adjustment of topographic trends is the result of secondary tensional forces. These forces were relieved by major faulting along the northern base of what are now the Elko Hills and tilting of the Adobe block forming the present day valley.

The principal structural features in the study area are two frontal faults. The trace of one of these faults in section 21 and 28 is shown in Plate 2 while the other which roughly parallels the river is not shown. The river fault is evidenced by the older Tertiary deposits laterally opposite younger Tertiary deposits and by the confinement of thermal waters to the southeastern portion of the study area. The trace of this fault could not be shown in Plate 2 due to its concealment by Quaternary sediments and the lack of deep well logs.

GROUND WATER

The ground water within the study area arises from precipitation over the surrounding hills, inflow beneath the Humboldt River, and downward percolation of river water. In general, the water beneath the hills around Elko flows toward the river where it joins southwestward moving waters which entered the valley fill below the river.

In several of the deeper aquifers, below 200 feet, south of Elko, thermal waters flow from south to north. These thermal waters appear to be restricted to the east of a north trending fault in sections 21 and 28 and to the south of a concealed fault which roughly parallels the river. Through fractures, faults, and other permeable zones, these waters may rise to the surface as the hot spring in section 21.

The ground water table varies in depth from less than 20 feet near the river to about 100 feet beneath the surrounding hills. Except in areas of a high water table in soft clays, construction of fills, bridges, and drainage structures for transportation projects should not affect the ground water. Near the river where the water table may be within 5 feet of the surface, settlement of large fills on soft clays may cause a lowering of the water table on the side of the fill toward the river and may cause the water to surface on the opposite side of the fill.

MINERAL DEPOSITS

Throughout the region numerous different mineral deposits have been and are still being produced. Within the study area mining has been for oil shales and gravel. Around 1920 oil was recovered from shales south and southwest of Elko. Oil production varied from a few gallons per ton of ore to 86.8 gallons per ton (Winchester, 1923) and was usually high in paraffin. Although oil shale mining here has been inactive for about 45 years, the present energy situation may renew mining activity.

Gravel deposits may be found throughout most of the area. Good deposits are readily found in the Quaternary sediments while good gravel deposits are more difficult to find in the Tertiary sediments.

In addition to mining, the thermal waters in the area suggests the possible development of hydrothermal energy.

SURFACE CHARACTERISTICS

SOILS AND VEGETATION

The soils and basic vegetation of the study area have been divided into seven units and shown in Plate 3. This map and the following unit descriptions are based on the work of E. L. Spencer (1964).

MOUNTAINOUS UPLANDS:

This soil occurs on the upper mountain side slopes. It is a shallow, moderately fine textured, neutral soil. The subsoil ranges from gravelly loam through very gravelly clay loam over quartzite. The surface is usually gravelly and/or cobbly. The soil slopes range from 10 to 31 percent while the exposed quartzite at the top of the mountain may stand vertically. Vegetation consists primarily of low sagebrush with little rabbitbrush.

NORTHERN ROLLING UPLANDS:

This soil occurs on rolling side slopes and ridge tops. It is a moderately deep, fine textured, neutral soil. The surface soil ranges from gravelly loam through gravelly clay loam. Slopes range from 4 to 31 percent. Vegetation consists primarily of cheatgrass and big sagebrush.

STEEP ROLLING UPLANDS:

The soils and vegetation of this unit are the same as the Northern Rolling Uplands except the slopes are steeper ranging from 16 to 51 percent.

LOW TERRACES:

The soils of this unit are moderately deep, medium through moderately fine textured, and mildly alkaline. The surface soils are medium texture and slopes range from 2 to 8 percent. Vegetation consists primarily of big sagebrush and cheatgrass.

SOUTHERN ROLLING UPLANDS:

This soil is a miscellaneous land type because of the erratic variations within short distances of soil depth, texture, and amount of carbonates. It occurs on terrace scarps and foothills. It is derived from tuffs which vary in texture from clay size to gravel. Most of it is shallow over tuff, fine textured, and moderately alkaline. Slopes range from 31 to 51 percent. The vegetation consists of big sagebrush, grasses, and juniper on higher slopes.

INTERMEDIATE TERRACES:

The soil of this unit occurs on intermediate terraces. It is a moderately deep, moderately fine textured, mildly alkaline soil over a weakly to strongly cemented silica pan. Surface textures range from very fine sandy loam through gravelly clay loam. Slopes vary from 2 to 8 percent. The vegetation consists primarily of cheatgrass and big sagebrush.

RIVER FLOOD PLAIN:

This area was unmapped by Spencer. The depth of the soil varies from moderate to deep and ranges in texture from coarse gravelly soils to fine clay loams. The soils are neutral near the river and increase in alkalinity with distance from the watered areas (Barrett, 1974). The slopes are less than 5 percent and vegetation consists primarily of greasewood, rabbitbrush, grasses, and crop lands.

SURFACE WATER AND EROSION

The surface waters of the study area originate from the Humboldt River and from precipitation runoff. The river enters the area from the northeast and meanders through the flood plain and exits to the southwest. Flooding of the river is well documented and should be expected in the immediate vicinity. Precipitation runoff in the study area flows toward the river. The annual precipitation in the area is usually less than 10 inches and the flow through streams is intermittent. Although flood control dams have been built to protect the city of Elko from flash floods originating outside the study area, major storms directly on the area will still cause flooding.

Erosion within the area may be divided into two categories, sheet erosion and gully erosion (Bennett, 1939). Sheet erosion is the relatively slow natural migration of material down hill slopes. The erosion and movement is caused by the sheet wash of precipitation waters, melting snow, frost, wind, gravity, and the movement of animals. Gully erosion refers to the depth and spacing of intermittent stream beds carved by the flow of surface runoff. Plate 4 shows the areas and degree of erosion in the study area.

LAND PRODUCTIVITY

The production capabilities of the land may be divided into two basic categories, crop lands and range. Crop lands lie in the immediate vicinity of the river where the production of hay and alfalfa is common. Further development of crop lands in the study area is restricted by the topography, alkali, cost of irrigation, and erodibility of soils. Consequently, most of the land in the area is used for range.

Plate 5 shows the land productivity disregarding cultural features. The map divides the range lands into three areas indicating the present range potential and the maximum range potential if the land is seeded and developed. These potentials were rated as high, medium, low, and very low depending on the amount of land required to support one head of cattle for one month (see Table 1). This evaluation of the land potential is a brief estimation made during a short field reconnaissance by Hugh Barrett at the request of this author.

TABLE 1

RANGE POTENTIAL RATING

HIGH - 1 to 5 acres to support one head of cattle
MEDIUM - 6 to 15 acres to support one head of cattle
LOW - 16 to 25 acres to support one head of cattle
VERY LOW - 25+ acres to support one head of cattle

ENGINEERING GEOLOGY

FOUNDATION CONDITIONS

The engineering properties of the surface and subsurface strata and the resulting foundation conditions within the study area have been divided into four areas. These areas are shown in Plate 6 and described below.

AREA 1:

Area 1 consists of the gentle to near level slopes of the river flood plain. The foundation material is discontinuous both laterally and vertically isolating silts and clay in some locations and sands and gravels in other locations. The water table in this area will usually be found within 20 feet of the surface.

Roadway bridges founded on silts and clays will require pile support while spread footings may support bridges founded on sands and gravels. Due to the greater load requirements of railroad bridges, all such structures will most likely require pilings. All bridge piers founded in the river should be supported by piles driven below the depth of river scour.

Fills for roadways and railroads over silts and clays must be designed and constructed to compensate for settlement and slope stability problems. In these areas where the water table lies within 5 feet of the surface, consideration must also be given to possible affects on the ground water. Fills built over sands and gravels should be 2:1 or flatter except in commercial and residential areas where retained earth fills should be considered to save on right-of-way costs.

All of the material in Area 1 is rippable and excavation back slope should be cut at 1 1/2:1 or flatter for stability.

AREA 2:

This is an area of gentle to moderate slopes of Tertiary lake sediments. The foundation material consists mostly of fines with subordinate strata of coarse sands and gravels. The water table here is usually of sufficient depth as to not affect or be affected by the construction of transportation facilities.

Although most of the bridges in this area will require piles for support, some isolated surface strata of sands and gravels may offer sufficient strength to allow the use of spread footings beneath roadway bridges.

Roadway and railroad fills will encounter few if any foundation problems. Fill slopes should not be steeper than 2:1. As in Area 1, retained earth fills should be considered in commercial and residential areas.

Although some of the material in Area 2 is consolidated, all of the material is rippable. Excavation back slopes in the area may stand vertically in some of the consolidated materials while unconsolidated silts and rhyolitic ash may require slopes of 4:1 or flatter.

AREA 3:

Area 3 consists of rhyolitic tuffs covered in some locations by poorly consolidated sediments. The material forms gentle to steep slopes and offers a good foundation to bridges and fills. Like Area 2, the water table should not affect or be affected by the construction of transportation facilities.

Although some bridges in this area may require piles, most bridges will be supported by spread footings. Fills with slopes of 2:1 or flatter will encounter few if any problems with settlement or stability.

The material is rippable and back slopes in excavations may stand as steep as vertical in many locations.

AREA 4:

This area consists of moderate to very steep slopes of quartzite. The rock is usually very hard and massive with few joints. Excavation of this material will most likely require blasting and back slopes will depend on the orientation of joints. The material will not settle beneath fills and spread footing should be used for all bridges.

SEISMIC POTENTIAL

The Elko area lies in a region of moderate seismic activity. The area will experience seismic shocks originating from major earthquakes in the 118° Meridian Seismic Zone and from lesser earthquake occurring within a 40 mile radius.

Figure 1 shows the locations of the major earthquake epicenters, magnitude 6.0 and greater, which have occurred in Nevada and its neighboring states from 1900 to 1960. Figure 2 shows major active faults and seismic zones within the same area. Although these maps indicate that

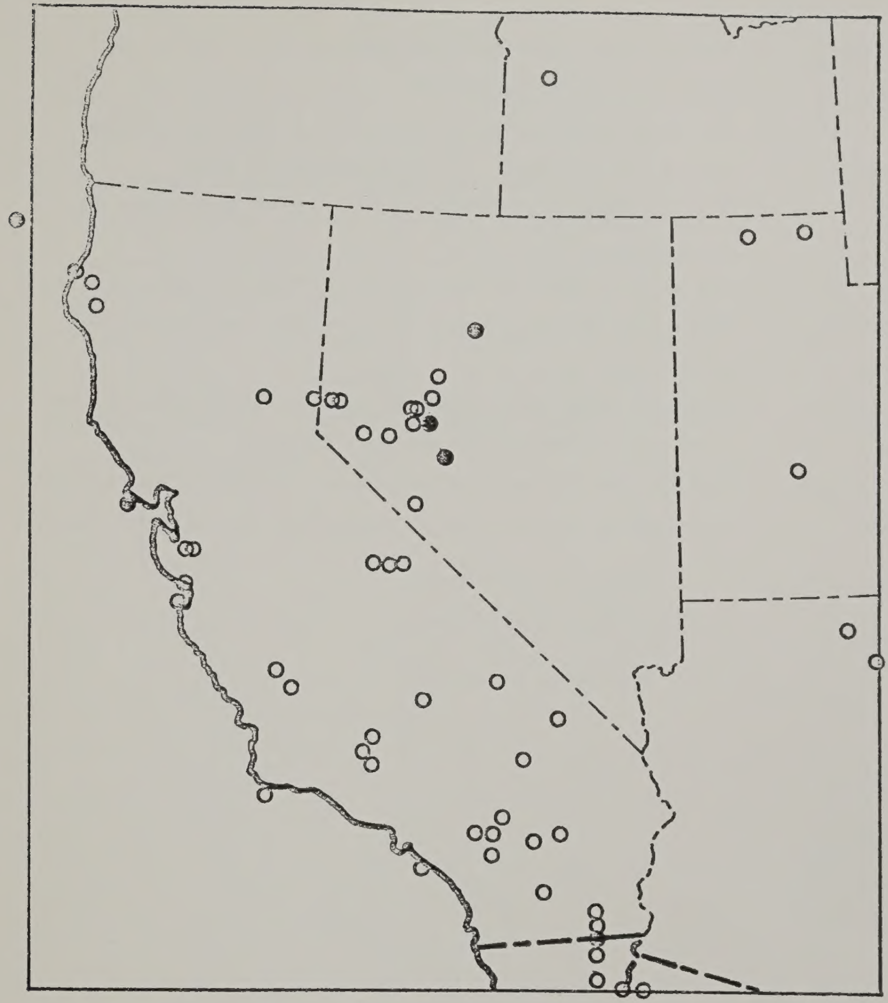

Figure 1 Regional distribution of major earthquake shocks from 1900 to 1960.

○ Magnitude 6.0 - 6.9
● Magnitude ≥7.0

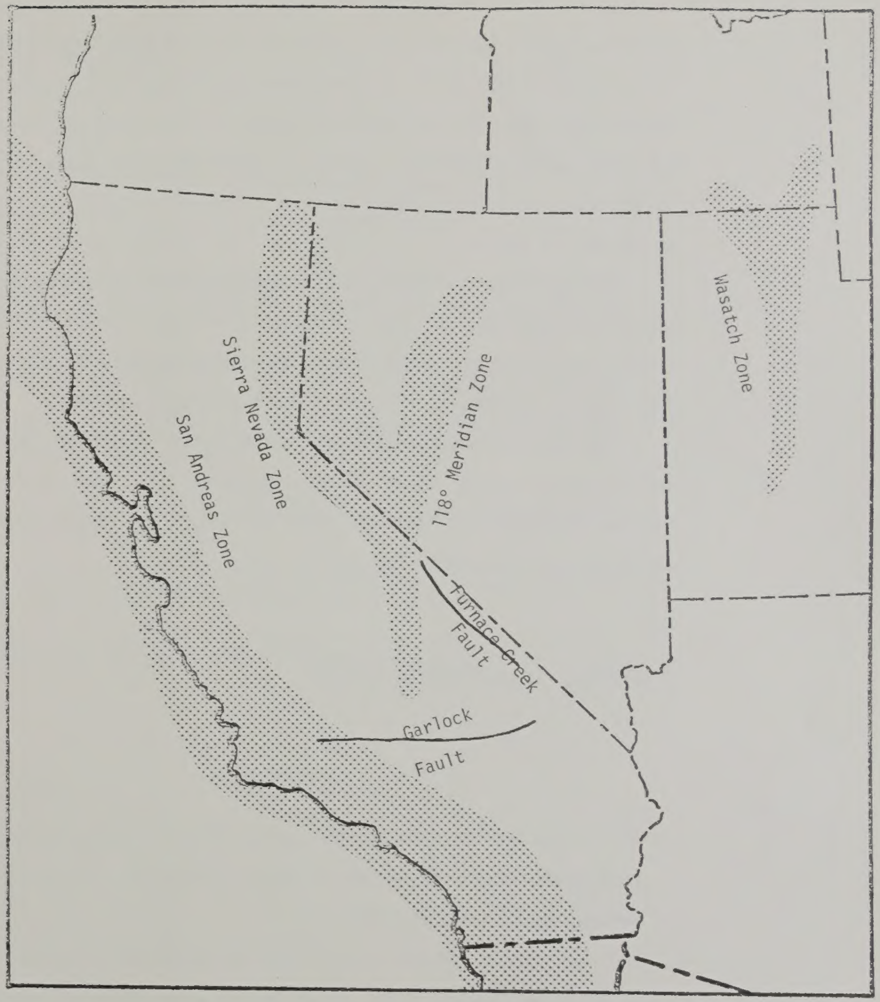

Figure 2 Major faults and fault zones in the southwestern United States.

major earthquakes will not occur within 80 miles of Elko, major shocks in the northern half of the 118° Meridian Seismic Zone will be felt. The bedrock accelerations from these earthquakes will decrease to less than 0.2 times the acceleration of gravity in the study area. Damage from these seismic events will most likely be minor depending on the ground response to the bedrock motion.

Small earthquakes may be just as damaging and possibly more so than those above depending on their intensity and distance from Elko. The seismic hazard of these events cannot be determined until all of the active faults within 40 miles of Elko are identified and classified.

The ground response to bedrock accelerations is moderate throughout most of the study area. Near the river there may exist isolated pockets of loose near surface saturated sand which may liquefy during earthquakes and very soft saturated clays which may amplify ground motion.

FINAL COMMENTS

CONCLUSIONS

1. This report has reviewed the geology and related aspects of the physical environment and may be applied to future highway and railroad projects constructed in the study area.
2. Although the construction of fills and structures will usually not affect or be affected by the ground water, large fills settling over soft clays may affect a high water table.
3. The only mining in the study area which may affect right-of-way acquisition will be gravel mining.
4. Most projects in the area may be subjected to occasional flooding arising from the river or from sheet wash off the hills.
5. Although foundation conditions are varied, severe problems are not anticipated.
6. The seismic potential of the study area is moderate. Damage resulting from earthquakes will depend mainly on the ground response to the seismic shock.
7. Due to the ground water recharge to the area from the north and northeast, land subsidence is not considered a problem.
8. Although landslides may occur under severe conditions of high precipitation and melting snow, they are presently not considered as a hazard.

RECOMMENDATIONS

1. Before construction of any project, a foundation study should be made for all bridges, major fills, and all excavation back slopes.
2. If additional information is required about the surface soils, vegetation, erosion, and land productivity, it is recommended that Hugh Barrett, Range Conservationist for the U.S.D.A. Soil Conservation Service be contacted in Elko, Nevada.
3. Finally, in view of the moderate seismic potential, an earthquake study of the region should be made and the earthquake design procedure presently used by the California Department of Transportation should be applied to structures in Elko.

Respectfully submitted,

O. J. Husband
Engineering Geologist I

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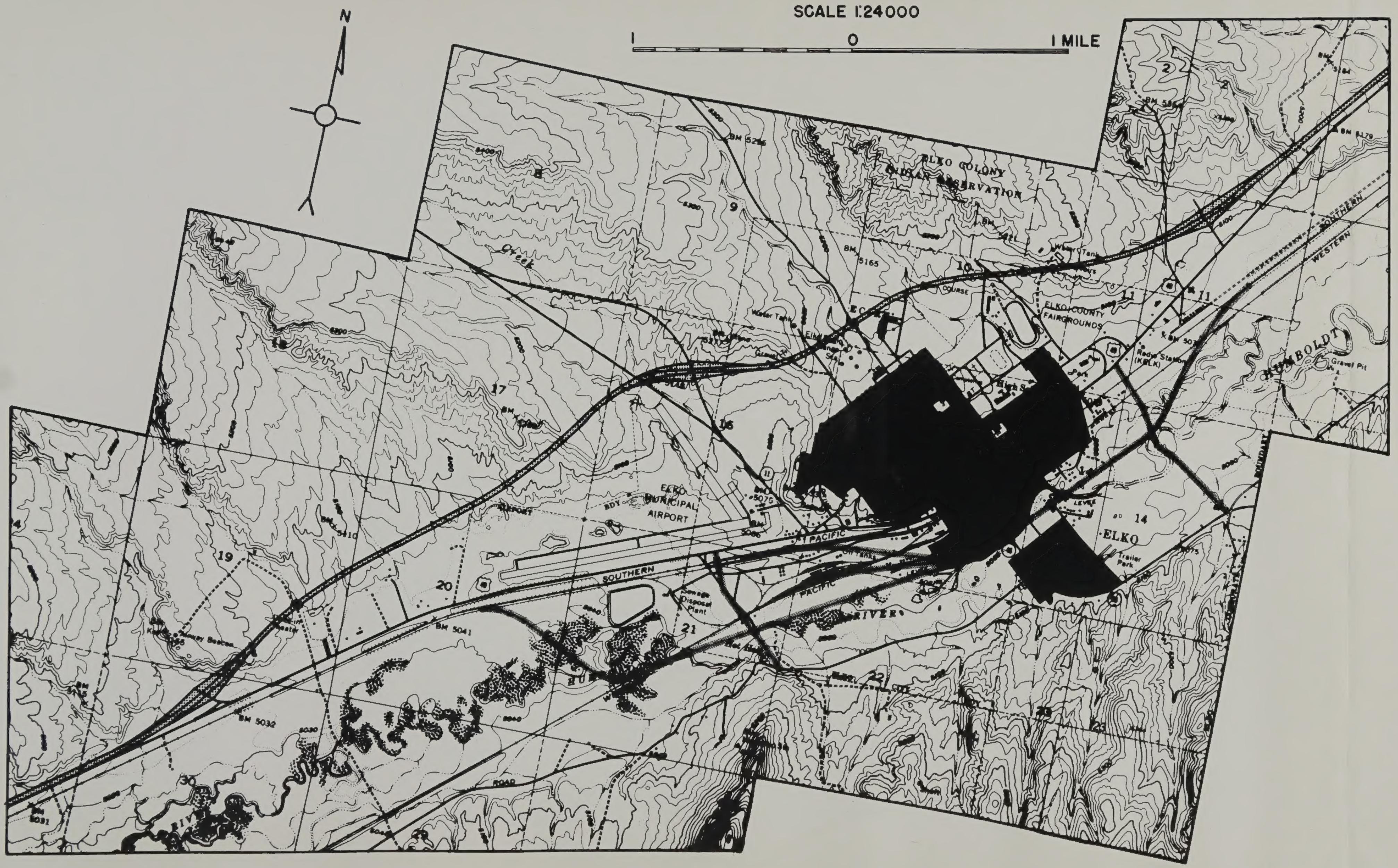


PLATE I

RELIEF MAP

CITY OF ELKO
ELKO COUNTY
NEVADA
1974

PROPOSED INTERSTATE 80 PROJECT

PROPOSED NORTH BANK ALIGNMENT OF THE RAILROAD RELOCATION PROJECT

THIS MAP IS BASED ON THE U.S.G.S. ELKO EAST AND ELKO WEST 7.5 MINUTE QUADRANGLES, 1962

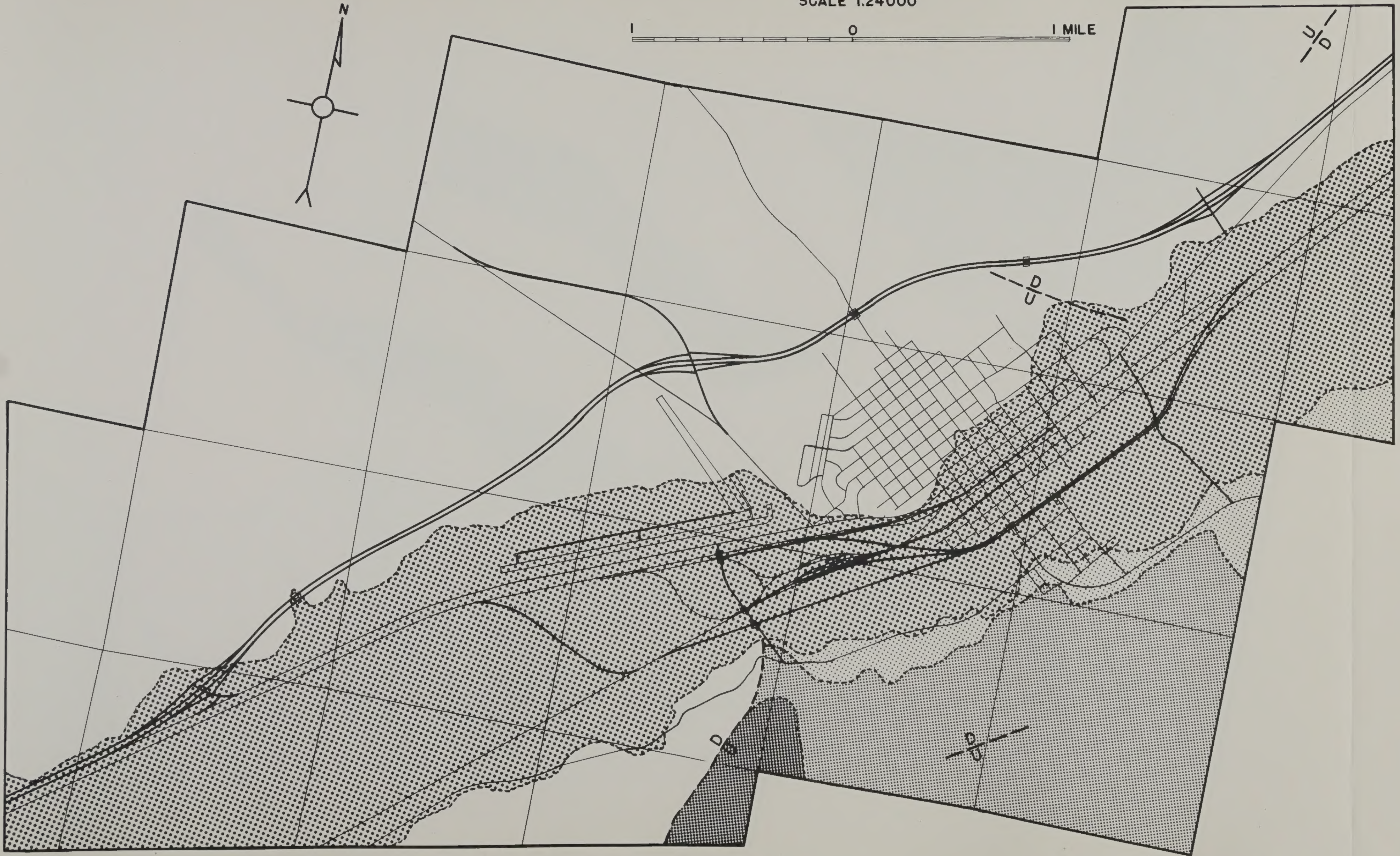


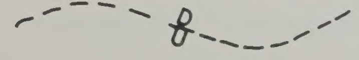
PLATE 2

GEOLOGIC MAP

CITY OF ELKO
ELKO COUNTY
NEVADA

by
J.J. HUSBAND
1974

- ▩ QUATERNARY ALLUVIUM
- ☐ UPPER TERTIARY SEDIMENTS
- ░ LOWER TERTIARY SEDIMENTS
- ▒ LOWER TERTIARY SEDIMENTS AND RHYOLITIC TUFFS - UNDIFFERENTIATED
- ▦ CARBONIFEROUS (?) QUARTZITE



FAULTS

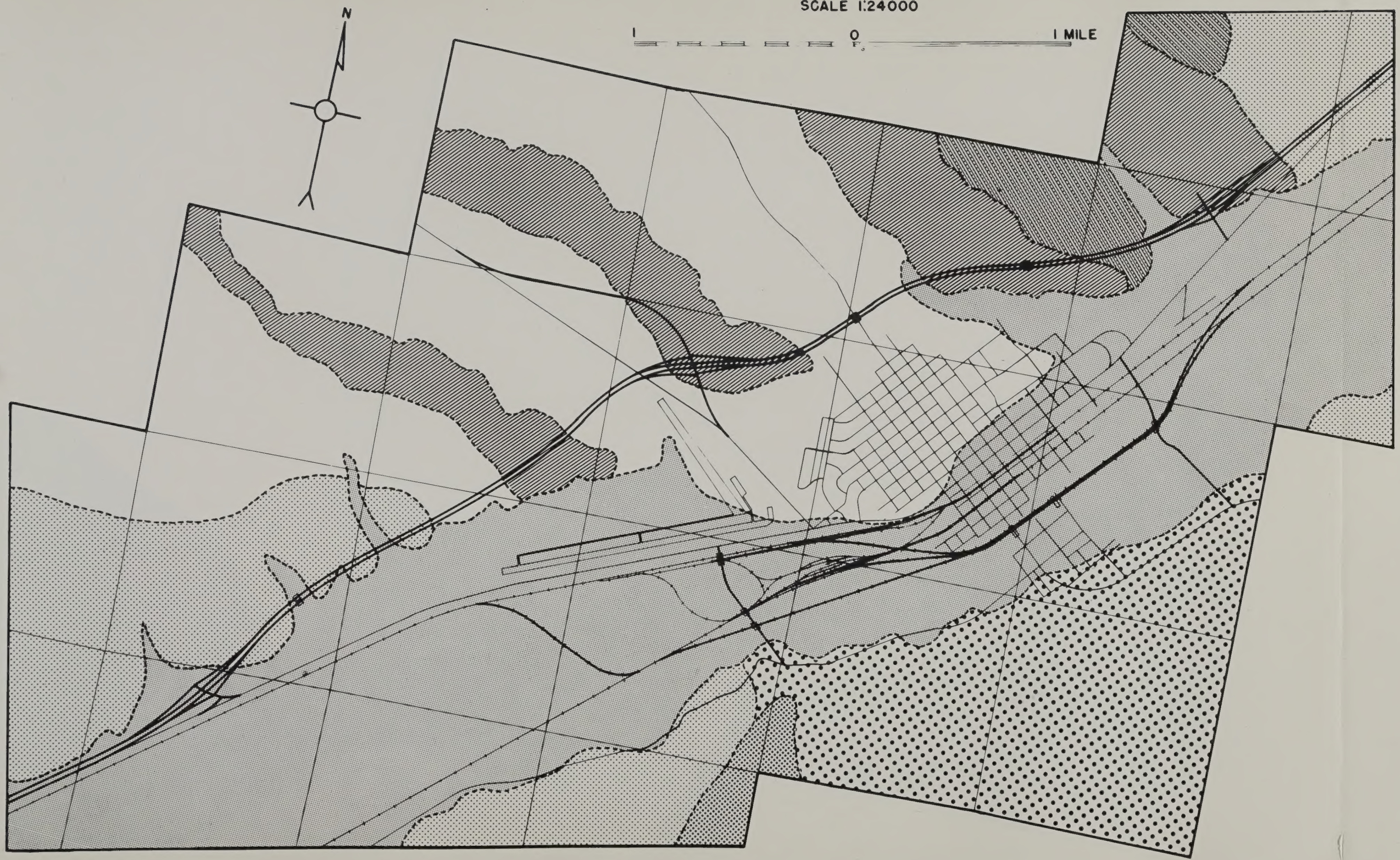
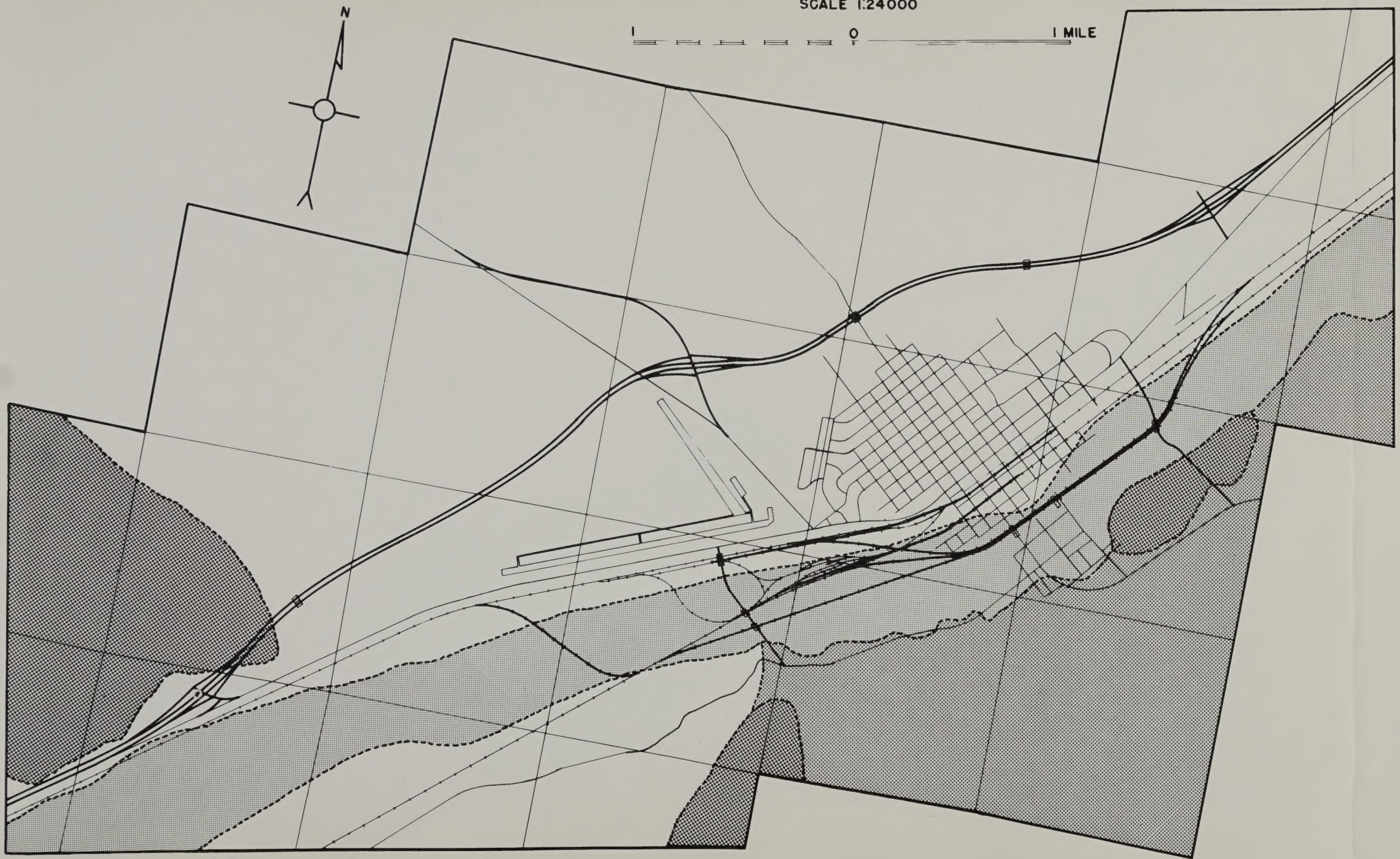


PLATE 3
SOILS AND VEGETATION
CITY OF ELKO
ELKO COUNTY
NEVADA
1974

REFERENCE: E.L. SPENCER (1964)

PLATE 4
EROSION POTENTIAL
CITY OF ELKO
ELKO COUNTY
NEVADA
1974



░ NO SHEET EROSION PROBLEM
VERY LITTLE GULLY EROSION

▓ SLIGHT SHEET EROSION PROBLEM
GULLIES MORE THAN 6" DEEP
AND MORE THAN 100' APART

☐ MODERATE SHEET EROSION PROBLEM
GULLIES MORE THAN 6" DEEP
AND MORE THAN 100' APART

▒ MODERATE SHEET EROSION PROBLEM
GULLIES MORE THAN 6" DEEP
AND MORE THAN 100' APART
WITH SOME GULLIES MORE THAN
2' DEEP

REFERENCE: H.H. BENNETT (1939)

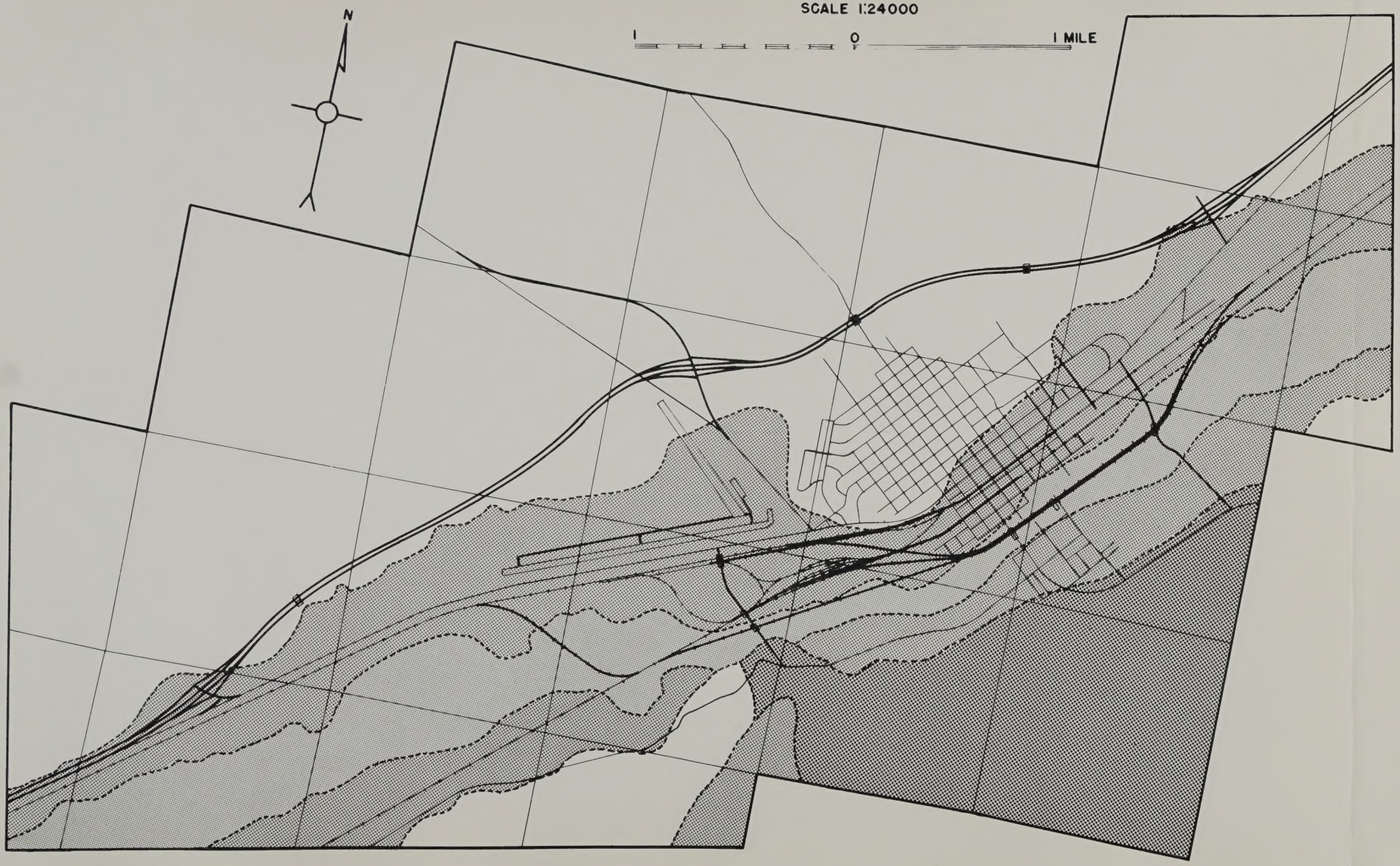


PLATE 5
LAND PRODUCTIVITY
CITY OF ELKO
ELKO COUNTY
NEVADA
1974

RANGE POTENTIAL

	PRESENT	MAXIMUM
☐	MODERATE	HIGH
▩	LOW	MODERATE
▨	VERY LOW	MODERATE
▒	CROP LANDS	

REFERENCE: HUGH BARRETT (1974)

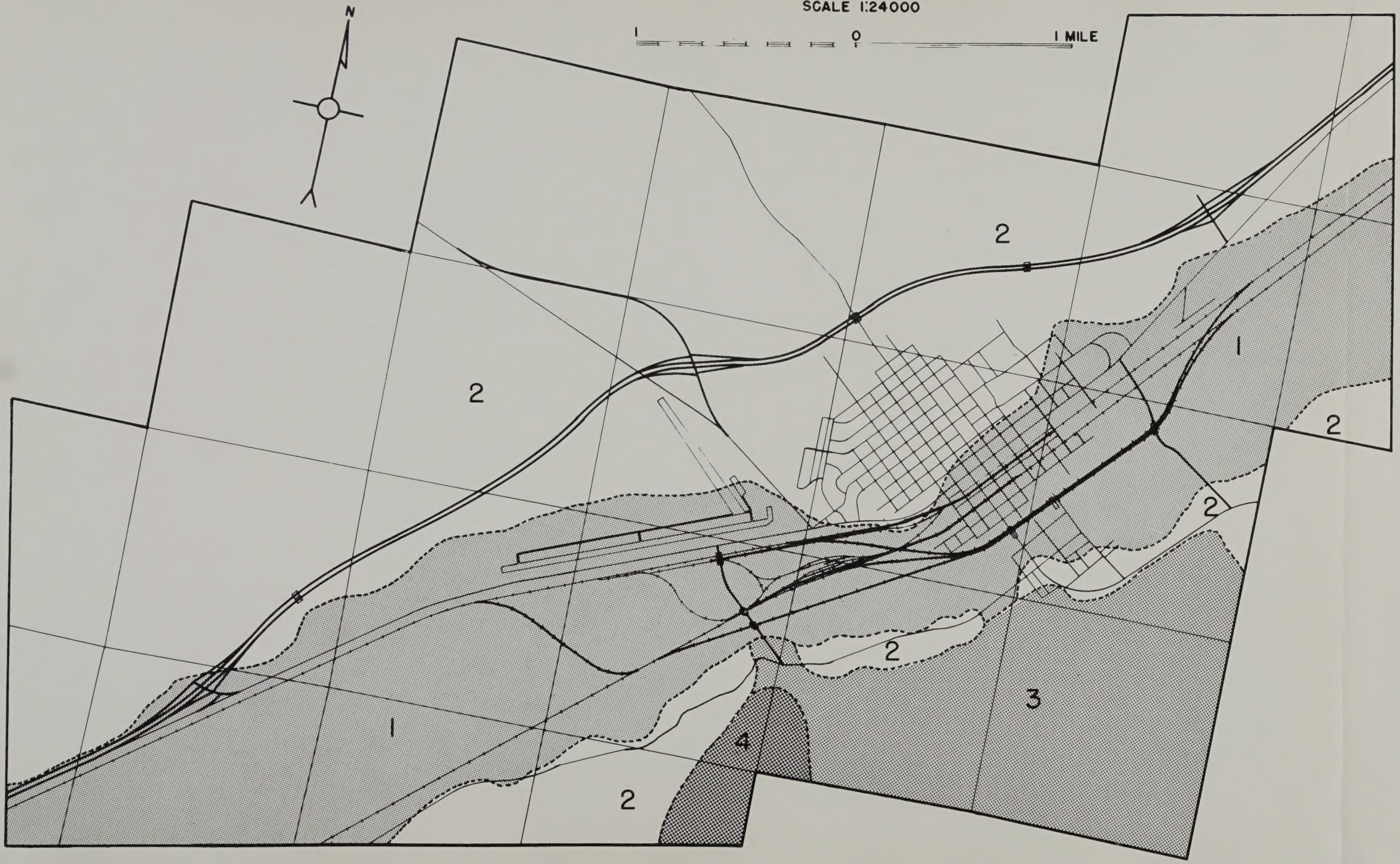


PLATE 6
FOUNDATION CONDITIONS
CITY OF ELKO
ELKO COUNTY
NEVADA

by
J.J. HUSBAND
1974

1	BOTH GOOD AND POOR FOUNDATIONS
2	MODERATE FOUNDATION CONDITIONS
3	GOOD FOUNDATION CONDITION
4	HARD BEDROCK AREAS

Appendix 2A

Historical Floods on the Humboldt River

Following is a detailed description of critical floods which have occurred on the Elko reach of the Humboldt River, as extracted from a report entitled "Water and Related Land Resources, Special Report Humboldt River Basin, Chronology of Flood Years and High Water Years," based on a cooperative survey by the Nevada Department of Conservation and Natural Resources and the United States Department of Agriculture, June 1962.

These floods can be classified as either "wet-mantle" or "dry mantle". A wet-mantle flood results from the saturation of the soil mantle to the point of overland flow. This condition is caused by extended periods of warm winter rain, rain on snow or frozen ground during the winter, or rapid melting of abnormal snow accumulations during the spring. Dry-mantle flooding primarily occurs during the summer and results from short periods of intense rainfall from summer thunderstorms on dry soils with thin or depleted vegetative cover. The soil mantle is only superficially wetted by the heavy rainfall, but the rainfall intensity is such that most of it runs off. Dry mantle conditions have been more prevalent on the lower reaches of the Humboldt than in the Elko area.

February 18 through March 15, 1910 Wet-Mantle

A system-wide flooding of the Humboldt. Flood brought on by extending periods of warm rains on heavy snow or frozen ground, particularly during the peak period, February 27 through March 5.

Southern Pacific and Western Pacific grades and bridges were damaged from Montello and Wells to Elko. Deeth was flooded by the ice jams in Mary's River; homes, warehouses, and other buildings were inundated, inflicting several thousand dollars damage.

The Western Pacific lost a small bridge at Halleck, and the Humboldt flowed over the W.P. tracks at Ryndon. The ice jams at Osino and through Elko on the Humboldt caused flooding of railroad installations, homes and business establishments in the vicinity of the river.

The 1884 Lytton (Ninth Street) Bridge in Elko was saved only by removing all floor planking and stringers; abutments washed out and bridge knocked out of alignment. Troy Laundry and all homes on Water St. flooded and many structures on Main St. Homes and business places along Court, Idaho, Railroad and Commercial Sts. flooded by overland flows from hills north of Elko, February 28. Hot Springs iron bridge (Humboldt) on South Fork road west of Elko badly weakened but not washed out. Bullion Bridge on South Fork of Humboldt washed out, isolating Bullion for almost two weeks. Bullion Rd. so badly washed it had to be relocated. Other South Fork, Ten-Mile, Huntington, Lamoille Creeks, North Fork, and Mary's River bridges in poor condition.

No streamflow measurements of this flood on the Humboldt or its tributaries were obtained; the few stream gages then in existence all washed out. Probably the greatest flood of record on the Humboldt, ranking with the 1862 flood, or even greater. The greatest, of course, from the standpoint of damage inflicted.

January 1 through April 1, 1914 Wet-Mantle

January and February flood period produced some flooding adjacent to the Humboldt west of the Ninth Street bridge in Elko, and in the meadows west of the town.

June 18 through 22, 1918 Dry-Mantle

Some flooding on the upper Humboldt from Elko to Carlin, from this storm series. Idaho Street in Elko and portions of the Elko-Tuscarora Road flooded.

April 3 through May 1, 1942 Wet-Mantle

Residential areas in Elko flooded, north and south of Humboldt River; rowboats used for the first time since 1910. Basements and some residences along Second St., the old Lamoille Road, Water St., and a cabin camp at Fifth St. flooded. Fifteen families evacuated. Stream channel through Elko clearer than in 1910, as there were no ice jams, and the old irrigation diversion dam below Fifth and another dam west of town had been removed. However, the low Lamoille Road Bridge (Ninth St.; the iron bridge erected on the Lytton Bridge site after the 1884 wet-mantle flood) and the Lamoille Road fill acted somewhat as a dam and levee, shunting the river out into the lower residential areas both north and south of the river.

As a result of the flood, the City of Elko later that year built a levee on the south side of the river, west from Lamoille Bridge (Ninth St.) to protect the south side areas. (Total cost $3,000.)

Some livestock loss all along Humboldt; miring, drowning, etc., forcing extensive movement of cattle to higher ground.

Landslide in Palisade Canyon near Palisade caused Humboldt to flood both W.P. and S.P. grades there. Beowawe flooded; water ran several feet deep in streets; rowboats used. Many residences flooded to second floor levels. Railroad fills above Beowawe washed badly; had to be reinforced. Dunphy, Russel, Horseshoe (Macmillan Cattle Co.), and Licking ranches flooded above Battle Mt.; Battle Mt. cut off from North Battle Mt. by washout of road and bridge over the Humboldt (no flood condition on Reese River). Bliss Ranches and others above Winnemucca flooded. All "tight dams" from below Elko west to Rye Patch blown out, to relieve flood pressure. Damage to bridges, roads, irrigation structures, ranch buildings, and erosion damage to fields and range areas.

East area of Winnemucca flooded along the river; water kept from 1910 flood area along the Bridge St. bridge by sandbagging, levees, etc.

Remarks

Heaviest flood all along the Humboldt except on the Little Humboldt and Paradise Valley since 1910. Mary's River and the North Fork of the Humboldt contributed the greatest flood flow, although all the Humboldt tributaries as far down as Boulder Creek (above Battle Mt.) dumped flood waters into the river. The flood was triggered by heavy warm rains accompanied by south winds on April 3 and 4, which melted unusually deep snow accumulations on the lower slopes.

Flood period peak, April 3 through 7 at Elko; April 22 through 28 at Winnemucca. Rye Patch and Pitt-Taylor reservoirs above Lovelock filled for the first time since construction of Rye Patch dam in 1936-37.

Wet-Mantle

Flood conditions triggered by terrific driving rain storm which lashed all of Nevada and eastern California on January 20 and 21, melting the winter snow accumulations. In Elko, heavy rain fell on January 20 and 21, lashed by gusts of wind up to 45 mph.

Loss of U.S. 40 concrete bridge over North Fork dammed that stream, blocking off the North Fork flow, the morning of January 23. Estimated damage to highway and bridge; $10,000. A section of the highway fill, 5 ft. deep and 25 ft. long, finally gave way about 3:00 P.M. that same day. This new crest, when added to the already swollen Humboldt, swept the river over the Elko levees erected in 1942. Flooding in Elko late that evening and most of the next day (January 24). Many portions of Elko, as in 1910, were already flooded, having been hit on Jan. 21 by overland flows from the hills to the north. (The Fair Grounds, East College Ave., the W.P. tracks from 6th to 12th Sts.). As a result, the combined effects of these two floods were considerably greater than the 1942 Elko flood. Many south Elko residents, who had considered themselves safe after the levees were built in 1942, (higher than the 1942 flood levels) found themselves flooded out again less than a year later; 20 families were forced to evacuate.

Besides the more tangible flood damages at Elko enumerated here, there were many intangibles, such as loss of business to local merchants because of the closure of U.S. 40 at the North Fork bridge. This bridge was out from January 23 to February 5, when a temporary wooden bridge was completed and the highway opened again. During the 11-day period of closure, all through auto traffic was diverted to U.S. 50. Bus passengers took the trains between Wells and Elko.

The 1943 flood produced, at least until the Feb. 1962 crests, the greatest flood crests recorded on many of the stream gages along the Humboldt and its tributaries (Palisade, 6,250 c.f.s., February 26, 1943; Chimney gage, Little Humboldt River, 4,000 c.f.s., January 22, 1943). Also, comparing the entire flood periods for both years, a greater volume of water went down the Humboldt in 1943 even in its upper reaches, as a study of the Palisade gage records for those years reveals. At Elko, the flood crest in 1943 was 2,450 c.f.s. (No flood crest figures are available for 1942 at Elko.)

At Elko, the inadequacy of the 1942 levees prompted the city authorities to enlarge and lengthen them later in 1943. The Russell ranch property immediately west of the town was acquired, an old irrigation dam there removed, diversion channels constructed, and the levees enlarged and extended to the Russell lands.

The levees were again strengthened during the heavy snow winter of 1948 through 1949. It was feared that the runoff in the spring of 1949 would result in another flood at Elko. Accordingly, the city removed the low Lamoille Bridge at Ninth St. early in 1949. The Army Corps of Engineers then engaged in strengthening the levees already in place, and extended them below the Fifth St. Bridge. The Corps also cleared the river channel through Elko of all trees, debris, or other obstructions. The expected flood failed to materialize in 1949, but all this improvement work proved its worth in the 1952 and 1962 wet-mantle floods. In 1959, after a 10-year period with no bridge at Ninth St., the City brought in an iron bridge and placed it on much higher abutments. The wisdom of this provision for additional clearance was evident when the February 1962 flood crest hit Elko.

1945 Flood

The Chronology of Flood Years and High Water Years makes no reference to a flood in 1945. However, according to records of the U.S. Corps of Engineers, Elko was partially inundated by high waters in 1945. (Ref: Letter from the USED to Mr. Dennis Hugh of Chilton Engineering, dated June 28, 1974), "However, information in our files indicates inundation of portions of Elko and, although damage data for this flood is acknowledged as being incomplete, it was concluded that, for the entire basin, damages suffered were only slightly less than for 1943."

February through May, 1952 Wet-Mantle

This system-wide flooding of the Humboldt resulted from the melting of the enormous masses of snow accumulated during the winter of 1951 through 1952. This winter, often contrasted with the 1889 through 1890 "Winter of White Death", had been so severe, and isolated so many ranches in Elko County, that "Operation Breakthrough" to relieve them was started on March 20, and carried on until April 1. President Truman declared Elko and Eureka Counties disaster areas, rendering them eligible for Federal aid.

At Elko, the levees erected in 1942 through 43 kept the Humboldt well within bounds, although it was higher than it had been in 1942 or 1943 (3,860 C.F.S., 1952; 2,540 C.F.S, 1943). At its crest on April 30, it was still about 6 ft. below the Fifth Street bridge, as contrasted with the February 1962 wet-mantle flood, when it was washing the bridge's under side.

Below Elko, the meadows along the river were all flooded; the river resembled a large lake. The Elko airport and stockyards immediately west of town were flooded.

RECORDED FLOOD DATA - HUMBOLDT RIVER AT PALISADE
(THROUGH 1962)

Winter Flood (1 Nov. - 31 Mar.)

Date	Peak flow (c.f.s.)	Max. mean day (c.f.s.)	Max. 5-day volume (ac.-ft.)
1962	6,610	5,510	41,480
1943	6,250	5,790	39,491
1921	4,300	4,210	36,953
1914	--	2,780	22,691
1939	1,900	1,900	18,050

Summer Flood (1 April - 31 July)

Date	Peak flow (c.f.s.)	Max. mean day (c.f.s.)	Max 5-day volume (ac.-ft.)
1952	6,050	5,930	581,580
1945	3,780	3,760	485,650
1921	--	4,210	433,800
1942	4,100	3,990	431,340
1917	3,170	3,170	396,100

NOTE: Gauging station is downstream from Elko.

SOURCE: U. S. Corps of Engineers

By April 4, flood conditions had begun to develop on the upper Humboldt, and much earlier than that on the Little Humboldt and in Paradise Valley (February). From Mary's River to Pine Valley, a flood crest began moving slowly downstream. Mary's River crested at 1,250 c.f.s. April 29; North Fork, 2,450 c.f.s. on April 20, and the Humboldt at Rundon, 10 miles east of Elko, 3,860 clf.s. on April 30. These still represent the highest maximum discharges, prior to 1962, for these gaging stations (no records available for 1910, 1890, etc.). The South Fork at its junction with the Humboldt 9 miles west of Elko measured 1,700 c.f.s. on April 29, which was only exceeded by its 1914 discharge measurements (no 1910 statistics).

August 6 through 28, 1961 Dry-Mantle

A series of almost State-wide daily thunderstorms during this period caused widespread localized damage from the eastern Sierra Nevada to Elko.

On August 6, a heavy afternoon thunderstorm over much of the Humboldt Basin resulted in widespread damage. Idaho Street in Elko flooded; basements of hotels and businesses along this street and along WP between Second and Fifth Streets, flooded, also damage to Elko Golf Course and Fair Grounds.

S.P. track weakened by small washouts near the Nevada Youth Training Center, east of Elko. Approximately $1,500 erosion damage to fields and installations at the training center. U.S. 40 was damaged by washing in this same vicinity by the August 6 storm. Three days for highway cleanup and repair.

February 9 through 13, 1962 Wet-Mantle

Six days of intermittent snow, rain and some hail in the middle and upper Humboldt Basin, from Battle Mountain eastward, effectively broke the three year (1959 through 1961) drought in the basin.

Beginning on February 9, and continuing through February 13, these storms also produced floods and high water in this same area. The floods were the result of continued rain on the snow pack and frozen ground at elevations generally around 6,500 ft. or below, almost approximating dry-mantle flood conditions at first, because of the frozen ground. However, the effect of the rain and warmer temperatures gradually melted the frost layer in the soil, and wet-mantle conditions developed.

Flood damage to structures, improvements, etc. at Elko, Carlin, Beowawe, Battle Mt. At Elko, thanks to the 1942 through 1949 levee system along the Humboldt, flood damage was light. There was no overland flow from north of town, as had happened in 1910 and 1943; whatever damages accrued in 1962 were confined to the vicinity of the Humboldt channel.

The North Fork flood waters reached Elko around noon on February 12, bringing with them a considerable amount of ice, which began collecting behind an irrigation diversion dam just west of Elko. It was necessary that evening to blast this ice accumulation in the Humboldt channel, to prevent a repetition of the ice gorge which contributed so materially to the 1910 Elko flood.

By noon of February 13, the Humboldt was washing the underside of the Fifth St. Bridge. Preparations were made to cut a bypass at the south side of the bridge, to reduce flooding when the anticipated Mary's River crest arrived. However, that crest was dissipated upstream, and the river started receding that afternoon, thus rendering the bypass unnecessary.

A portion of the north levee along the Humboldt channel between the Fifth and Ninth St. Bridges in Elko began washing that afternoon, thus rendering the bypass unnecessary.

A portion of the north levee along the Humboldt channel between the Fifth and Ninth St. Bridges in Elko began washing that afternoon. An auto-wrecking yard, a trailer court, and a few homes near the Fifth St. Bridge were partially flooded. Old car bodies were dumped into the channel to prevent the cutting action on Feb. 13; the following day concrete blocks were dropped in the same places for further protection, although the flood crest had dropped 2 feet by that time.

The flood threat at Elko on Feb. 13 also brought on preparations to sandbag the doorways of the new Southside School, but these were stopped when the floodwaters began receding. All students brought to Elko by bus from the south were dismissed the morning of Feb. 13, to prevent their isolation in Elko should the bridges there go out.

Preliminary data obtained from George Heenan, Assistant State Engineer at Elko, indicate that the 1962 flood on North Fork (Feb. 12) was the highest ever measured there: 8,000 to 10,000 c.f.s., from slope-area measurements (no data for 1910). This also applies to the Humboldt crest at Elko; the gage at Rundon, east of town, registered 6,230 c.f.s., with some water flowing behind the gage. When this unmeasured volume is considered (slope-area measurement), the crest would approximate 6,500 through 7,000 c.f.s. The maximum discharge at the Palisade gage for the 1962 flood period was 6,630 c.f.s., considerably greater than the previous maximum of 6,250 c.f.s. on February 26, 1943.

FLOOD FREQUENCIES ON HUMBOLDT RIVER AT PALISADE

Estimated Frequency of Occurrence Once in Years Shown	Without Three Proposed Reservoirs* Upstream From Palisade Gaging Station	Assuming Construction of Three Proposed Upstream Reservoirs*
	Snowmelt Floods	
100	7,700	3,170
50	6,000	2,600
20	4,400	2,050
5	2,730	1,470
2	1,650	1,100
	Rain Floods	
100	13,500	10,300
50	8,500	6,000
20	4,400	2,850
5	1,350	830
2	500	270

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*NOTE: Two of these reservoirs would be upstream, and one downstream, from City of Elko.

SOURCE: U. S. Corps of Engineers

Appendix 2B

Water Quality Analysis of the Humboldt River during Flow

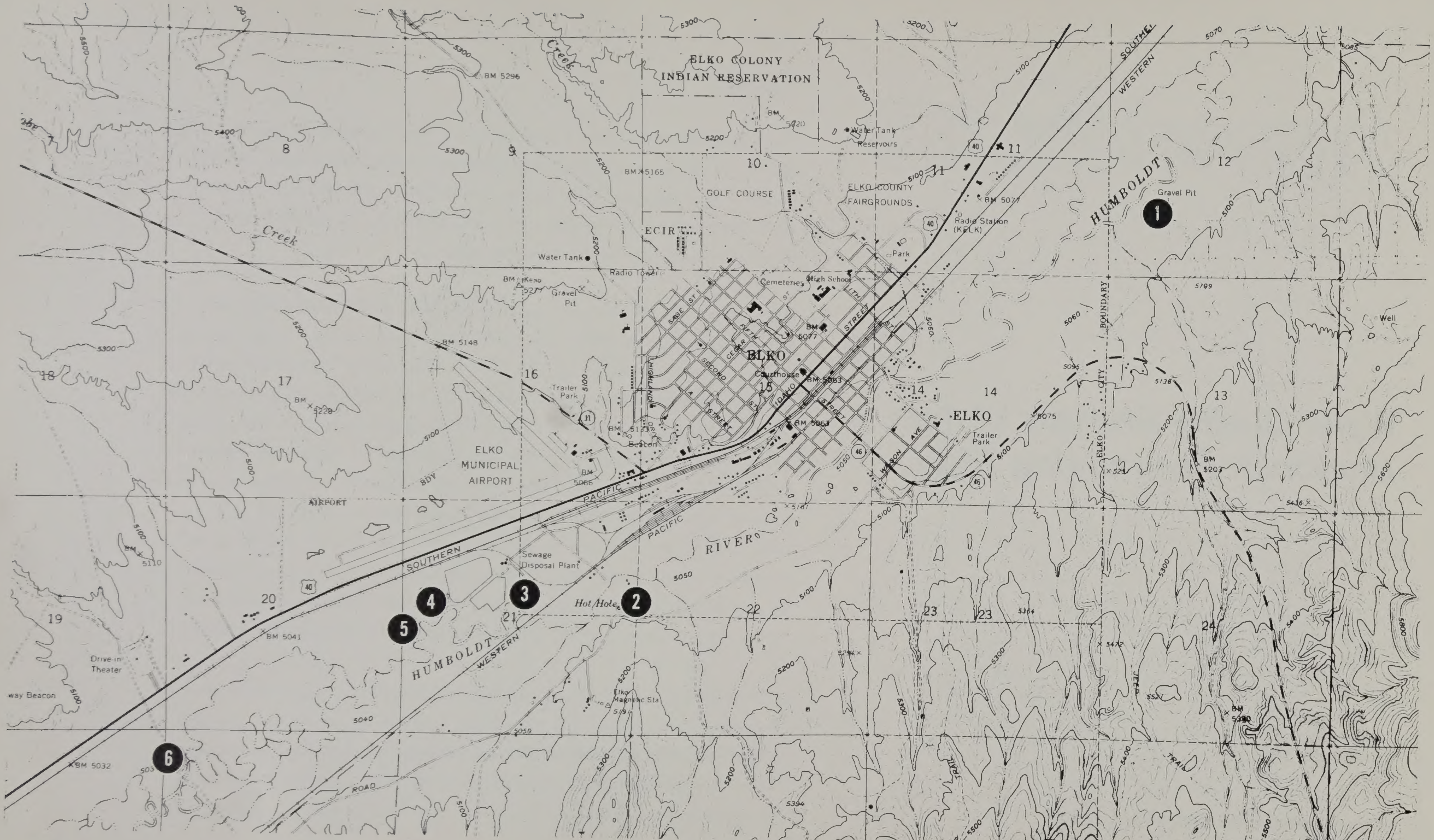
Chilton Environmental Laboratory

INTRODUCTION

A testing program was started in April of 1974 in order to determine the chemical, physical, and bacteria characters of the Humboldt River in Elko, Nevada. A testing program of this extent has never been accomplished along this section of the River and it is felt that this information could be important to the rechannelization of the river and construction of the new city park.

Sample Points. On the outset of this testing program, serial sample points were selected along the river within Elko. After some initial testing, it was found that the sample points were relatively the same in their water quality. Some of the initial sampling included the downtown area (Fifth Street and Ninth Street Bridges) but it was found that there was not sufficient changes of the river to warrant further testing. For this reason three sample points(Exh. A2B-1)were selected because they appeared to be representative of this area. Sample point #1, east of Elko, was chosen to determine the water quality before entering the City. Sample point #2, at the "hot hole" discharge point to the river, was necessary to establish the effect of the hot water entering the river. Sample point #3, 200 yards east of the Elko sewage treatment plant, was selected to show the dilution effect of the hot water leaving the hot hole and termine the water quality before the discharge of the Elko sewage treatment plant.

Later during this testing program (mid-May), the possibility of construction near the Elko sewage treatment plant made it necessary to extend the testing area. For this reason, three additional sample points were selected: #4, 1,400 yards down river from the Elko sewage treatment plant discharge; #5, 1,670 yards down river from the Elko sewage treatment plant; and #6, -- miles down river of the Elko sewage treatment



① *East Elko*

② *Hot Hole and River*

③ *200 Yards East of Elko Sewage Treatment Plant*

④ *1430 Yards below Elko Sewage Treatment Plant*

⑤ *1666 Yards below Elko Sewage Treatment Plant*

⑥ *Roy Young Bridge*

Water Quality Sample Points

plant at Roy Young Ranch Bridge. These sample points were necessary to determine the dilution effect on the discharge of Elko sewage treatment plant.

Selection of Tests. After confering with Nevada Fish and Game, Nevada State Environmental Health Department, Dr. David Emerson (Northern Nevada Community College), the following tests were selected and placed in the following categories:

Nutrients:	Ammonia (NH_4), Phosphates (PO_4)
Organic:	Biochemical Oxygen Demand (BOD)
Solids:	Suspended and Total
Chemical and Physical:	Sulfates (SO_4)
	Chlorides (Cl), Alkalinity
	Dissolved Oxygen (DO)
	pH, Temperature, and Flows
Bacteria:	Total Coliform and Fecal

Period of Samples. The testing program started during April at which time the river was beginning to crest (700 cfs). The river normally has a seasonal high flow (1,000 to 800 cfs) during the month of April and May with a lowering of the river starting in late May to mid June. Testing has continued during these lower flow periods but at this time there is not sufficient data to draw any valid conclusion.

Sampling Procedures. Samples were collected at least once a week during the high flow period. Samples were also collected at night and from the bottom of the river. All samples were grab samples collected in an unpreserved bottle. Most samples were run within eight (8) hours after collection and bacteria tests were set up within four hours after collection. All tests were run according to Standard Methods for the Examination of Water and Wastewater, 13th Edition. This book will hereafter be referred to as Standard Methods. Some cross sectional samples were also taken and samples were collected from both sides of the river.

TESTS

Nutrients. Nutrients are chemical compounds that are limiting factors on the growth of most aquatic plants. The two tests selected for this section were ammonia and phosphates. These tests were selected because of the simplicity and quickness in running the tests and they are acceptable indications of the nutrient content.

Ammonia (Chart A). Ammonia (NH_4) in surface or ground water generally results from decomposition of nitrogenous organic matter. Rivers considered to be free from heavy organic load, normally has low ammonia concentration. The ammonia test was the direct nesserization methods and the results are recorded as ammonia nitrogen. Free ammonia may be calculated by multiplying the results by 1.288. The test results illustrate an average ammonia of .3 mg/l (ppm) with a range from .2 mg/l to .9 mg/l. The tests indicate a fairly even distribution of ammonia from point to point with a slight increase east of Elko. The increase in this area may be due to livestock waste.

Phosphates (Chart A). It is generally believed that phosphates are usually the cause and the limiting factor in algae blooms. Phosphates are commonly found in washing powder and are used in commercial fertilizers. Phosphates generally find there way into rivers and lakes through sewage treatment plants and by surface runoff. Because of the difficulty in running total phosphates, ortho phosphates were measured by the stannous chloride method. Normally, ortho phosphates represent about 80% of the total phosphates. According to the test data, ortho phosphates ranged from .05 to .4 mg/l with an average of .15 mg/l. There was some slight variation from point to point with the greatest variation found below the Elko sewage treatment plant with the high of .4 mg/l.

NUTRIENTS TESTING

Chart "A"

	EAST ELKO		HOT HOLE AT RIVER		ABOVE STP		BELOW STP #1		BELOW STP #2		ROY YOUNG BRIDGE	
	NH_4	PO_4	NH_4	PO_4	NH_4	PO_4	NH_4	PO_4	NH_4	PO_4	NH_4	PO_4
May												
High	0.9	0.2	0.6	0.2	0.5	0.2						
Low	0.5	0.1	0.5	0.1	0.5	0.1						
Average	0.7	0.1	0.5	0.1	0.5	0.1						
June												
High	0.5	0.1	0.3	0.2	0.5	0.1	0.3	0.4	0.2	0.3	0.2	0.2
Low	0.2	0.1	0.2	0.05	0.2	0.1	0.2	0.2	0.2	0.1	0.2	0.1
Average	0.4	0.1	0.2	0.1	0.3	0.1	0.3	0.2	0.2	0.2	0.2	0.2
2 Months												
High	0.9	0.2	0.6	0.2	0.5	0.2	0.3	0.4	0.2	0.3	0.2	0.2
Low	0.2	0.1	0.2	0.05	0.2	0.1	0.2	0.2	0.2	0.1	0.2	0.1
Average	0.5	0.1	0.4	0.1	0.4	0.1	0.3	0.2	0.2	0.2	0.2	0.2
Average of all 6 points	0.3	0.15										

Organic (Chart B). The organic test, as estimated by the BOD, indicates the amount of organic compounds related to or derived from living organisms. The decomposition of the organic matter causes a depletion of oxygen thus causing unfavorable conditions for aquatic life. The BOD test results should only be used as a rough indication as to the rivers combined effect upon organic substances. According to Standard Methods, actual oxygen demand of surface waters are highly questionable, since laboratory environment does not reproduce stream conditions. This test was used just for a comparison of the river condition from season to season. The BOD tests range from 2.3 mg/l to .1 mg/l, with an average of .7 mg/l. These results did have a wide range but this was expected due to the test involved.

Solids. Two tests were selected for solid testing: total solids, and suspended solids. Other solid tests such as bed loading were not used because of lack of materials and time.

ORGANIC TESTING

Chart "B"

	EAST ELKO	HOT HOLE AT RIVER	ABOVE STP	BELOW STP #1	BELOW STP #2	ROY YOUNG BRIDGE
Average 3 Months	B.O.D.	B.O.D.	B.O.D.	B.O.D.	B.O.D.	B.O.D.
High	2.3	2.1	2.2	1.6	1.0	1.0
Low	0.1	0.1	0.1	0.1	0.1	0.1
Average	1.0	0.8	0.8	0.8	0.5	0.5
Average of all 6 points	0.7					

Suspended Solids (Chart C). Suspended solids are those that are trapped on an asbestos mat. The suspended solids are the lightest solids and are generally always in suspension in a velocity above 1.7 fps. The average velocity during this test period was above 2.0 fps (Chart F) indicating that there was very little settling of the suspended matter. The test results showed an average suspended solids of 104 mg/l with a range of 47 mg/l to 226 mg/l. Lower values were correlated when the flow of the river dropped to 200 cfs. Even with high velocity, there appears to be less bank erosion and surface runoff at flows lower than 200 cfs, thus lowering the suspended solids.

Total Solids (Chart C). The total solids consists of the suspended solids and the dissolved solids consist mainly of bicarbonates, chlorides, sulfates, and phosphates. Dissolved solids are calculated by subtracting the suspended solids from the total solids. The total solids of the river ranged from 332 mg/l to 560 mg/l with an average of 388 mg/l. Subtracting the average suspended solids, 104 mg/l, from the average total solids, 388 mg/l, leaves a total dissolved solids average of 284 mg/l.

Chemical and Physical. Chemical tests were selected on the basis of availability of testing equipment and from past evidence of their effect and quantity in the river.

SOLIDS TESTING

Chart "C"

	EAST ELKO		HOT HOLE AT RIVER		ABOVE STP		BELOW STP #1		BELOW STP #2		ROY YOUNG BRIDGE	
	Suspended Solids	Total	Suspended Solids	Total	Suspended Solids	Total	Suspended Solids	Total	Suspended Solids	Total	Suspended Solids	Total
April												
High	226	480	226	446	176	436						
Low	119	352	141	344	126	356						
Average	158	417	171	397	151	376						
May												
High	113	456	143	472	136	492						
Low	82	369	87	401	97	412						
Average	106	488	116	432	112	431						
June												
High	74	560	129	401	129	411	104	392	104	408	125	308
Low	47	332	52	299	49	381	61	308	75	408	82	308
Average	78	503	61	348	94	396	83	350	89	408	103	308
3 Months												
High	226	560	226	472	176	492	104	392	104	408	125	308
Low	47	332	52	299	49	356	61	308	75	408	82	308
Average	114	469	116	392	119	401	83	350	89	408	103	308
Average of all 6 points	104	388										

Sulfate (SO) (Chart D). Sulfates are not toxic to aquatic plants except in high concentration. However, in higher concentration sulfate can precipitate calcium to cause toxicity. It appears that sulfates are natural accruing compound in this area and will be dissolved in the river. The test selected for sulfates was a turbidimetric method using barium chloride. The test results showed an average of 49 mg/l with a range of 35 mg/l to 68 mg/l.

Chlorides (Chart D). Natural water contains small amounts and diverse proportions of various salts. The principal salts are those of chlorides, sulfates, carbonates and phosphates of sodium, potassium, calcium and magnesium. The test selected for chlorides was the argentometric method using silver nitrate. The test results showed a range from 6 mg/l to 15 mg/l with an average of 10 mg/l. The data was consistent with all samples except a slight raise at the hot hole area, with the high of 15 mg/l.

CHEMICAL AND PHYSICAL TESTING

Chart "D"

	EAST ELKO			HOT HOLE AT RIVER			ABOVE STP			BELOW STP #1			BELOW STP #2			ROY YOUNG BRIDGE		
	ALK	SO_4	Cl	ALK	SO_4	Cl	ALK	SO_4	Cl	ALK	SO_4	Cl	ALK	SO_4	Cl	ALK	SO_4	Cl
April																		
High	140	63	12	140	59	12	142	69	12									
Low	131	63	11	132	59	10	134	59	10									
Average	137	63	11	138	59	11	140	59	11									
May																		
High	190	68	12	195	62	15	185	65	11	174	48	9	175	46	8			
Low	134	40	6	154	36	8	150	37	8	174	48	9	175	46	8			
Average	168	54	10	168	49	12	160	50	10	174	48	9	175	46	8			
June																		
High	204	48	9	213	38	9	208	47	9	195	42	11	197	65	9	194	65	10
Low	184	42	9	154	35	9	180	40 9	9	174	40	11	197	42	9	194	35	10
Average	191	45	9	187	36	9	193	44	9	190	41	11	197	54	9	194	47	10
3 Months																		
High	204	63	12	213	62	15	208	65	12	195	48	11	197	65	9	194	65	10
Low	131	40	6	132	35	8	134	37	8	174	40	9	175	42	8	194	35	10
Average	165	54	10	164	48	11	164	51	10	182	44	10	186	50	9	194	47	10
Average of all 6 points	176	49	10															

pH (Chart E). The reaction of the water as to relative acidity and alkalinity is measured as hydrogen ion concentration expressed inversely as pH. A pH of 7.0 is natural with acid on the lower scale and alkalinity above 7.0. A standard meter was used to measure pH. The test results showed an average pH of 8.2 with a range of 7.9 to 8.4 with no variations from point to point except for a slight drop at the hot hole area with the low of 7.9.

Alkalinity (Chart D). Alkalinity is the capacity of the water to accept protons, and provides a quantative measure of the ability of a sample to neutralize strong acids. Alkalinity is usually imparted by the bicarbonate, carbonate and hydroxyl components. The procedure selected for this test was the potentiometric using a pH meter. The test results showed an average of 176 mg/l with a range of 131 mg/l to 213 mg/l. The alkalinity appeared to increase as the flow decreased. An alkalinity relationship can be made using the pH value, to show the main contribution of the alkalinity. The calculation was made and it was found that the river consisted mostly of bicarbonate ions.

CHEMICAL AND PHYSICAL TESTING Chart "E"

	EAST ELKO		HOT HOLE AT RIVER		ABOVE STP		BELOW STP #1		BELOW STP #2		ROY YOUNG BRIDGE	
	D.O.	pH	D.O.	pH	D.O.	pH	D.O.	pH	D.O.	pH	D.O.	pH
April												
High	8.0	8.1	8.0	8.1	8.0	8.1						
Low	6.0	8.0	6.0	7.9	6.0	7.9						
Average	7.0	8.1	7.0	8.0	7.0	8.0						
May												
High	9.0	8.1	8.0	8.1	8.0	8.1		8.3		8.2		8.3
Low	7.0	8.0	6.0	7.9	7.0	7.9		8.2		8.2		8.3
Average	8.0	8.1	7.5	8.0	8.0	8.0		8.3		8.2		8.3
June												
High	9.0	8.4	9.0	8.3	8.0	8.4	9.0	8.1	9.0	8.3	9.0	8.3
Low	6.0	8.2	6.0	8.2	6.0	8.1	7.0	8.2	7.0	8.2	8.0	8.2
Average	8.0	8.3	8.0	8.2	7.5	8.2	8.5	8.2	8.0	8.3	8.5	8.3
3 Months												
High	9.0	8.4	9.0	8.3	8.0	8.4	9.0	8.3	9.0	8.3	9.0	8.3
Low	6.0	8.0	6.1	7.9	6.0	7.9	8.0	8.1	7.0	8.2	8.0	8.2
Average	8.0	8.2	7.5	8.1	7.5	8.1	8.5	8.3	8.0	8.3	8.5	8.3
Average of all 6 points	8.0	8.2										

Dissolved Oxygen (Chart E). Free oxygen is constantly being withdrawn from the water by living animals and by agents of decomposition. The supply of this dissolved oxygen is replenished intermittently by plants in photosynthesis. The procedure selected for this test was the Hachs Dissolved Oxygen Kit. The test results showed an average of 8.0 mg/l with a range of 6.0 mg/l to 9.0 mg/l. The data were consistent at all sample points and no variations, even with night or bottom samples,

Flows. Flows were gathered from the U.S. Geological Survey Gaging Station, 10 miles east of Elko. The flows in April were about 840 cfs and the river maintained this level until late May when the river began to fall to around 500-600 cfs. The river continued to fall and at the time of this report, August 27, 1974, there is no flow at the Ninth Street bridge. A rectangle weir has now been installed at the hot hole area in order to obtain more reliable flow data.

Temperature. Temperatures were taken each time dissolved oxygen was tested. The range of temperature was from 50°F to 76°F with an average of 72°F. The temperature was uniform from point to point. The temperature of the hot water flowing into the river was 112°F and the hot hole itself was 140°F. As the river dropped, the temperature increased in the area of the hot hole. With very little flow, the temperature in the river below the hot hole area is 112°F.

Bacteria (Chart G). Because the direct search for the presence of specific pathogenic organisms is uneconomical and too slow for routine control purposes, the water is examined for indications of fecal contamination. It is assumed that when such contamination is found the water is potentially dangerous. The bacillus Esherichia Coli (a common intestinal inhabitant of man) is selected as the indicator organism. The two tests selected for this testing were total coliform and fecal coliform, the latter being incubated at a high temperature. The procedure used was the multiple-tube fermentation technique, using lactose broth and EC medium. The test results for total coliform bacteria show an average total of 4,472 and fecal at 97. The range for total was 90 to 24,000 with a marked increase below the Elko sewage treatment plant. The range of fecal was 0.0 to 200 with also an increase below the Elko sewage treatment plant, but not as great as with the total coliform.

BACTERIA TESTING

Chart "G"

	EAST ELKO		HOT HOLE AT RIVER		ABOVE STP		BELOW STP #1		BELOW STP #2		ROY YOUNG BRIDGE	
	Total	Fecal	Total	Fecal	Total	Fecal	Total	Fecal	Total	Fecal	Total	Fecal
May												
High	1,500	150	930	70	11,000	90						
Low	250	40	390	40	460	40						
Average	875	95	660	55	5,730	65						
June												
High	1,500	90	11,000	90	24,000	150	24,000	200	24,000	60	24,000	150
Low	210	0	90	0	150	40	150	0	230	0	230	150
Average	719	80	1,864	43	1,001	68	5,063	83	7,012	33	12,115	150
2 Months												
High	1,500	150	11,000	150	11,000	150	24,000	200	24,000	60	24,000	150
Low	90	0	90	0	150	40	150	0	230	0	230	150
Average	644	65	1,213	156	763	96	5,063	83	7,012	33	12,115	150
Average of all 6 points	4,472	97										

DISCUSSION

Test data generally show acceptable conditions for warm water. The nutrients, ammonis and phosphates were within normal limits. The maximum limit for ammonia is 1.5 mg/l and the limit for phosphates is 1.0 mg/l. The average ammonia was .3 mg/l and phosphate was .15 mg/l. The organic test was low with an average BOD of .7 mg/l. There are no maximum limits for BOD, they vary from river to river, but a BOD of .7 mg/l is considered in a low range. The solids, both suspended and total, are high but this might be expected with high velocity. Most of the solids were from bank erosion, and also some solids coming from snow runoff. The sulfate was slightly high with an average of 49 mg/l. According to Water Quality Criteria, State of California, 50% of the rivers had sulfates of 32 mg/l with threshold limits of 1,000 mg/l. A sulfate of 49 mg/l should support warm water game fish. The chlorides, pH and dissolved oxygen were within limits and should not create any problems with aquatic life. The alkalinity showed the presence of bicarbonates which tend to shift the pH values toward the basic range. This increase of pH value creates low carbon dioxides which constitutes a favorable condition for aquatic plants and animals. The flow was the most important factor during the test period. It appears that due to the high flow, most of the chemical and physical elements were dilutes to a point that they showed very little effect upon the river. It is felt that as the flow decreases, the chemical and physical factors will be modified to a point that they might interfere with the aquatic life. The bacteria testing showed high count throughout the testing area. This high count apparently comes from the watering of livestock in the river. It should be noted that the high coliform counts do not directly mean the presence of pathogin organisms, only the potential.

CONCLUSION AND RECOMMENDATION

No river is pure in a chemical or a strict biological sense. If it was, it would be no place for fish. Our concern with this river is not to keep it strictly pure, but to keep it clean. By clean, it means well oxygenated, free from odor and free from any substance that would be toxic to man, fish or the living food for the fish. According to the U.S. Department of the Interior Federal Water Pollution Control Administration, "An unpolluted stream normally support a variety of aquatic organisms with relatively few of any one kind. Any significant change in this normal balance usually indicates pollution." It is felt that if care is taken during re-construction of the river channel and the new city park that it should not interfere with the normal balance of the river. The river should return to its natural clean state within a short period after the construction. Suggestions that might help maintain the river balance include:

(1) The new channel should be opened during high flow periods. This will help to minimize the possible effect of increased sulfates, bicarbonates, and solids in the area of the new channel.

(2) Establishing a baseline. A continuous testing program for one full year in order to complete a full river baseline. This seems necessary due to the variable conditions of the river and lack of available and reliable data.

(3) Additional testing in the area of the Elko sewage treatment plant. This seems necessary because it has been demonstrated that there is a direct link between the plant and the river. Any construction in this area could disrupt the normal percolation and evaporation, characteristics, and biological processes of the plant.

SUPPLEMENT REPORT ON WATER QUALITY ANALYSIS, LOW FLOW

INTRODUCTION

A testing program was started in April 1974. The initial report included data during high flow conditions. This supplement report includes data from mid-July to the first of September. The sample points, selection of tests and sampling procedures remained the same during this test period.

TESTS

NUTRIENTS

AMMONIA: The ammonia testing shows about the same result except for a large increase below the Elko sewage treatment plant. The average was .3 mg/L with a range of .1 mg/L to 6.0 mg/L. The 6.0 mg/L was below the sewage treatment plant. The ammonia appeared to disperse before it reached the Roy Young Bridge (approximately two miles).

PHOSPHATES: The phosphates ranged from .02 mg/L to 1.3 mg/L with an average of .4 mg/L. As with the ammonia, there was a substantial increase below the Elko sewage treatment plant with a high of 1.5 mg/L. The increase of both ammonia and phosphates below the Elko sewage treatment plant is due to the low dilution of the river with Elko sewage discharge.

ORGANIC: The organic test, BOD, shows an average of 5.3 mg/L with a range of 1.2 to 9.2 mg/L. The higher range is below the Elko sewage treatment plant with an average of 7.8 mg/L. This indicates an increase of organic loading below the Elko sewage treatment plant.

SOLIDS

SUSPENDED SOLIDS: The suspended solids averaged 42 mg/L with a range of 12 mg/L to 87 mg/L. With the increase below the Elko sewage treatment plant. The majority of the solids below the Elko sewage treatment plant was caused by algae.

TOTAL SOLIDS: The total solids averaged 513 mg/L with a range of 56 mg/L to 720 mg/L. The average was high during low flow period, caused by the increase of solids in the hot hole area and the Elko sewage treatment plant discharge.

CHEMICAL AND PHYSICAL

SULFATE (SO_4): The sulfate averaged 170 mg/L with a range of 127 mg/L to 200 mg/L. The test results show a fairly even distribution of sulfate with a slight increase in the area of the Elko sewage treatment plant. The average was higher during low flow period indicating increased sulfate due to evaporation and low dilution. Sulfates are commonly found in the soil in the Elko area.

CHLORIDES: The chlorides averaged 40 mg/L with a range of 19 mg/L to 71 mg/L. There was an increase below the Elko sewage treatment plant with a high of 71 mg/L.

pH: The average pH was 8.4 with a range of 7.5 to 8.8. The low pH of 7.5 was in the hot hole area and the high pH, 8.8, was below the Elko sewage treatment plant.

ALKALINITY: The range of alkalinity wsa 103 mg/L to 285 mg/L with an average of 205 mg/L. This is a slight increase from high flow at the high east of town and the hot hole area.

DISSOLVED OXYGEN: The dissolved oxygen averaged 18 mg/L with a range of 6 mg/L to 25 mg/L. The 25 mg/L represents a super saturated water and was found below the Elko sewage treatment plant. The reason for the high dissolved oxygen is a high amount of algae found being discharged from the Elko sewage treatment plant.

FLOWS: The flows varied from 100 cfs (mid-July) to 0.0 cfs (mid-August) east of Elko. This zero flow usually occurs about once every six to eight years. The flows from the rectangle weir installed below the hot hole discharge shows a flow of 1.6 cfs. This flow represents the water being discharged from the Elko storm drain and from the hot hole. The Elko sewage treatment plant discharges about 2.5 cfs, this shows a total flow east of Elko of 4.1 cfs. This means that the Elko sewage treatment plant discharge is about 61% of the total flow west of Elko.

TEMPERATURE: The temperature remains about the same during low flow with a slight increase to 82°F, except for a marked increased below the hot hole discharge that averages 112°F.

BACTERIA: The total coliform averaged 8,576/100 ml with a range from 230/100 ml to 24,000/100 ml. The fecal averaged 277/100 ml with a range of 40/100 ml to 750/100 ml. This shows a marked increase from the high flow condition. This increase is apparently due to the low dilution of the Elko sewage treatment plant discharge. It should be noted that the high fecal coliform of 750/100 ml is above the Nevada State health standards.

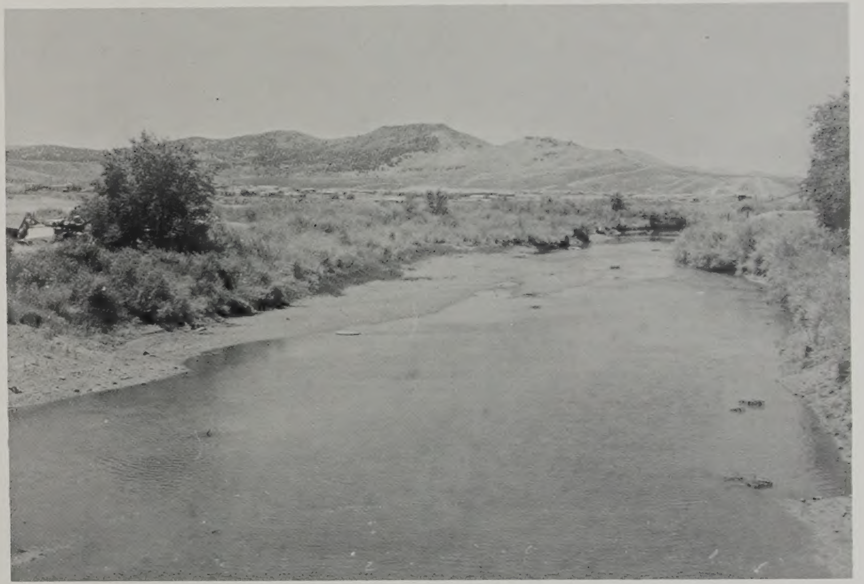
DISCUSSION

The test data during low flow shows a marked increase of all testing, especially in the area below the Elko sewage treatment plant and at the hot hole. The ammonia was within limits except below the Elko sewage treatment plant where it reached a high of 6.0 mg/L, which is well above the limit of 1.5 mg/L. This is also true for the phosphates which show a high of 1.3 mg/L that is above the limit of 1.0 mg/L. The organic testing was high, below the Elko sewage treatment plant, with a high of 9.2 mg/L BOD. This indicates a moderate high organic loading below the sewage treatment plant which might create an oxygen deficiency. The solids were also high below the sewage treatment plant, especially the suspended solids. The sample points above the sewage treatment plant show very little difference from the high flow sampling. The sulfates were higher but were still below the threshold limit of 1,000 mg/L. These sulfates should not interfere with warm water fish. The chlorides, pH, dissolved oxygen and alkalinity were higher but not of a degree to create any problems with the aquatic life. The flow did show a marked drop from 800 cfs to zero flow, east of Elko. Due to this low flow, the chemical and physical increased because of the low dilution effect of the river. The bacteria counts still show high counts of both total and fecal coliform. The highest count coming from below the Elko sewage treatment plant, but there is still a high count east of Elko.

RECOMMENDATION

According to this testing data, at this time, the Elko sewage treatment plant is discharging high organic loading into the river. Because of this, it is recommended that the river flow be kept at near normal conditions in order to flush out the river during high flow periods. It should be noted that the City of Elko is now upgrading their waste treatment plant and by January 1977 it should be able to produce a better quality of effluent.

Appendix 3A



A Limnological Survey of the Humboldt River, June 1974

Report by David N. Emerson under the terms of the Subconsultant
Contract for the Elko Demonstration Railroad Relocation Project
between Chilton-De Leuw Cather, J. V. and David N. Emerson, Ph.D.
May 30, 1974

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INTRODUCTION

Few biological data exist on the Humboldt River in Eastern Nevada which provide guidelines for making estimations of the impact of environmental disturbances. The Elko Demonstration Railroad Relocation Project in the City of Elko involves the straightening of one or more curves in the river. The channelization would involve cutting a new route and the filling in of the old natural channel. This study gives qualitative and semi-quantitative estimations of plankton content and of bottom organisms on points along the river, with special emphasis on the section of river between first and tenth streets in Elko. The data provide a preliminary estimation of the environmental impact related to the railroad relocation project.

MATERIALS AND METHODS

A. Plankton.

1. Collection. A #12 plankton net (125 meshes per inch) of ten inches diameter (0.55 square foot area) was used. This net collects particles and organisms larger than 40 microns. Most samples were collected approximately 6 feet from the river bank with the net attached to a pole. Samples from the river center were collected from the 5th street bridge with the net attached to a nylon rope. All collections were of one minute duration. Total volume of water flowing through the net was estimated by multiplying the current velocity (feet per second) by the area of the net opening by the number of seconds collection. Several samples were taken from areas such as pools with little or no current. These samples were taken by making several sweeps with the net.
2. Analysis. Samples were studied within 12 hours after collection. Samples were shaken, and heavy particles allowed to settle for about 30 seconds. Most of the supernatant was decanted into test tubes; 0.5 ml 37% formalin was added to each 10 ml supernatant; centrifugation separated material in this preparation, and the concentrate was studied by means of wet mounts under a compound microscope. Water from the remainder of the sample, which consisted largely of fine silt and organic debris, was used to make wet mounts to study live material. At least five or six wet mounts of both preserved and live material were examined under the scanning lens and high power lenses of the compound microscope to insure a representative inspection of each sample. Larger organisms were studied as necessary using a dissecting microscope.
3. Identification. Primary aids in identifying organisms were: A.P.H.A., Standard Methods (1971); Needham and Needham (1962); and Ward and Whipple (1959).

B. Physical data.

1. Temperature. Temperature, measured with a standard water thermometer, is recorded in degrees Fahrenheit.
2. Current velocity. Current velocity was calculated from the time in seconds required for a cork to reach the end of a

20 foot thread.

3. Depth. Depth was estimated with a calibrated stick.

C. Ash weights of sediment. Sediment collected in the plankton net was dried, and the total weight for each collection was recorded. The sample was thoroughly ground with mortor and pestle, and a 200-300 milligram portion was ashed in pre-weighed crucibles by heating to red heat for about 5 minutes with a propane torch. Ash weights are recorded as percent of dry weight.

D. Bottom organisms (macroinvertebrates, or benthic organisms).

1. Collection. A modified Peterson type dredge (LaMotte # 1061) which samples an area of approximately 0.25 square foot was used in shallow waters. At least four samples were taken from each area to give a total sample of at least one square foot.

2. Separation. Samples collected with the dredge were washed into a bucket, and a fine slurry was made. The slurry was poured through a U. S. Standard No. 30 sieve. Such a sieve retains those organisms which are defined as macroinvertebrates (A.P.H.A. Standard Methods, 1971). The material retained in the sieve was washed into collecting bottles.

3. Identification. All material was examined under a dissecting microscope within 12 hours after collection. Aids in identification included those used for plankton.

4. Dry weights. Bottom organisms were dried in pre-weighed aluminum weighing pans to obtain total dry weight of collections.

E. Periphyton. Periphyton is defined as the community of microorganisms associated with the surfaces of objects (A.P.H.A. Standard Methods, 1971). Periphytic organisms were obtained from algae masses in the river, and from scrapings of surfaces of stems of submersed rooted plants and from dead branches and other debris along the river. The organisms were examined with the compound microscope and identified using the references given for plankton. Rooted vegetation was identified with the aid of Britton and Brown (1970) and Ward and Whipple (1959).

F. Sample points. Table 1 gives the location, a brief description, date sampled, temperature, and current velocity at each sample point.

RESULTS

A. Description of river sediment (Table 2). Plankton net collections of one minute duration consisted of sediment ranging in total weight from 1.1 to 2.5 grams. Most of the sediment was inorganic fine silt. Organic matter as determined by ash content ranged from 7.7% to 13.1% of samples. Microscopically, most of the organic matter was detritus consisting of plant fragments. Probably not more than 0.1%, as estimated visually, of the organic matter was living plankton. Because of the large quantity of material other than living plankton, it was impossible to directly count or weigh organisms; however, a reasonable estimate is approximately 3 grams of living organisms per 10^6 cubic feet of water (Table 2). Each sample of 66 cubic feet (or approximately 2 cubic meters) contained at most only a few hundred organisms.

B. Plankton collections

1. Phyto-plankton. Phyto-plankton collected from all points consisted of 6 genera of blue-green algae, 22 genera of green algae, and 17 genera of diatoms (Table 3). Of the total of 45 different genera, 22 were found in both the river and in quiet water, 14 were found in the river only, and 9 were found in quiet water only. The most common algae found in almost all collections include the blue green alga, *Anabaena*; the desmid, *Closterium*; filamentous green algae *Cladophora*, *Microspora*, *Mougeotia*, *Spirogyra*, and *Zygnema*; and diatoms, *Diatoma*, *Navicula*, and *Synedra*. There was a notable absence of flagellated green algae in

TABLE 1. Description and characteristics of sampling points.

point	location of the sample point	sample types	date 1974	temp. (°F)	current (ft/sec)
1.	South bank of river, 4.0 miles east of intersection of Metzler Road and Lamoille Highway	plankton	6/10	67	2.0
2.	South bank of river, 0.5 miles east of 9th street bridge	plankton; bottom; periphyton.	6/5	63	2.0
3.	North bank of river, and inlet* near 9th street bridge	river plankton; inlet bottom; river periphyton.	6/2	68	1.8
4.	Center of 5th street bridge	plankton	6/2	68	2.0
5.	North bank of river, 0.1 miles west of 5th street bridge	plankton	6/2	68	2.0
6.	South bank of river in line with first street	plankton; periphyton.	6/5	64	1.4
7.	N. bank of river, 13.7 miles west of intersection of Hwy. 40 and Mountain City Hwy.	plankton	6/9	66	2.0
A.	Ditch* leading from river to field, 3.3 miles east of intersection of Metzler Road and Lamoille Highway	plankton	6/13	83	0.5
B.	Ditch* in field, 2.4 miles from intersection of Metzler Road and Lamoille Highway	plankton	6/13	84	none
C.	Small pool* 1-2 feet above river level, 013 miles east of 9th street bridge, and nearby river.	pool plankton; pool bottom; river bottom.	6/10	76 pool 69 river	none pool 1.5 river
D.	Oxbow* 0.6 miles west of intersection of River and South 1st Streets, and nearby river.	oxbow plankton; oxbow bottom; river periphyton.	6/17	82 oxbow 70 river	none oxbow 1.0 river
E.	Small pool*, sandbar, and river 300 feet northeast of hothole	pool bottom; river bottom; river periphyton.	6/12	85 pool 71 river	none pool 1.0 river
F.	Small pool* 100 feet south of sample point 6	zoo-plankton	6/5	78	none

*These points are referred to as off-river points, or quiet waters in this report. At the date indicated, the areas were isolated from the river, but are related to the river system because they are connected to the river at higher water levels (points 3 inlet, C, D, E, and F) or provide return flow from meadows (points A and B).

When observed on June 25, the water level of the river had further receded, and the pools at points C, E, and F were nearly dry. Plankton sampling areas at points 2 and 6 were a series of ripples created by low water and debris in the river.

During the sampling dates, the river levels changed as recorded in feet at the 5th street bridge: 5/29, 3 3/4 feet; 6/3, 4½ feet; 6/6, 4½ feet; 6/11, 4 feet; 6/17, 3 feet; and 6/25, 2 3/4 feet.

TABLE 2. Total weight and ash content of sediment collected in the plankton net (one minute collections).

Sample point	1	2	4	5	6	7
Total dry weight (gms) of sediment	2.51	1.81	2.02	----	1.64	1.10
Ash content of sediment (%)	9.2	13.1	9.6	11.1	10.4	7.7
*Estimated weight of living plankton is approximately 3 grams (or 6.6 x 10^{-3} lbs) per 10^6 cubic feet of water.						

*Assumptions:
a. Average current is 2 feet per second (Table 1).
b. Average weight of sediment is 2 grams.
c. Average ash content is 10%.
d. Not more than 0.1% of the ash content is living plankton, estimated from visual inspection.
e. The number of cubic feet of water passing through the net is the area of the net opening X current velocity in feet per second X 60 seconds: 0.55 square feet X 2 feet per second X 60 seconds = 66 cubic feet of water per sample.

collections from quiet water, although all samples taken from the river contained one or more genera of these forms.

2. *Zoo-plankton*. Zoo-plankton collected from all points consisted of several protozoans; 9 genera of rotifers; occasional flatworms and roundworms; 6 genera of cladocerans; 3 genera of copepods, including many of their nauplii larvae; ostracods; an isopod; and larvae and nymphs of several insects (Table 4). Of the total of 31 categories of zoo-plankton listed in Table 4, 21 were found in both the river and quiet water, 6 were found in the river only, and 4 were found in quiet water only.

C. *Bottom organisms* (Table 5).

Several samples, particularly those in the river, contained no organisms. The most productive area was sample point D where a 2 square foot sample of river-bank mud contained 21 roundworms and a *Chironomous* larva. The bottom samples from still water usually contained mayfly nymphs and roundworms.

D. *Periphyton*. Surfaces available in the Humboldt River to which microorganisms can attach include occasional logs or other debris, overhanging branches from shore vegetation, dead branches in the river, and rooted aquatic vegetation along the river bank or in quiet pools.(Tables 6 and 7). Algae masses most common in swift water consisted of *Cladophora*. These masses were found clinging to other surfaces, and the *Cladophora* itself acted as a surface for harboring microorganisms such as several species of diatoms (mostly *Diatoma*); green algae (mostly *Spirogyra*); two species of rotifers (*Gastropus* and *Euchlanis*); a few roundworms; and a few dipteran larvae. In quiet water, algae masses were mostly *Spirogyra* (Table 7) which usually harbored some rotifers or micro-crustaceans.

TABLE 3. *Summary of phyto-plankton collections*. The symbol x indicates identification of the genus listed at each point.

Sample point	River Plankton							Off-River Plankton				
	1	2	3	4	5	6	7	A	B	C	D	E
BLUE GREEN ALGAE												
Anabaena[a,b,c]		x	x	x		x			x	x	x	x
Anacystis[a,b,c]									x			
Gleotricha									x			
Gomphosphaeria[a,e]		x							x			x
Oscillatoria[b,c]				x								x
Rivularia[b]												x
GREEN ALGAE Flagellated and other motile forms.												
Chlamydomonas[c]		x	x	x	x	x	x					
Chlorogonium[c]					x							
Eudorina[e]			x		x							
Euglena[c,e]								x				
Gonium[e]					x		x					
Pleodorina				x								
Synura[a]					x							
Volvox[a]	x	x	x	x	x	x						

TABLE 3 (continued). Summary of phyto-plankton collections.

Sample point	River Plankton							Off-River Plankton				
	1	2	3	4	5	6	7	A	B	C	D	E
GREEN ALGAE Desmids												
Ankistrodesmus[d]			x						x			
Closterium[b]	x	x	x	x	x	x	x	x	x	x	x	x
Cosmarium							x					
Netrium												x
Penium					x		x		x			
GREEN ALGAE Filamentous and other forms												
Cladophora[d,f]	x			x	x	x		x				
Coelastrum[e]					x		x	x				
Microspora[f]		x				x	x	x	x		x	x
Mougeotia[e]	x		x	x	x	x	x	x	x			x
Oedogenium[f]			x									
Spirogvra[b,c]	x	x	x	x	x	x			x	x	x	x
Tribonema[b]	x			x	x	x	x					
Ulothrix[d,f]			x	x		x	x		x			
Zygnoma[e]	x	x	x	x	x	x	x		x	x		
DIATOMS												
Amphora									x			
Cyclotella[b,d]									x			
Cocconeis[d]									x			
Cymbella[b,f]	x	x				x	x		x		x	
Diatoma[b]	x	x	x	x	x	x	x	x	x	x	x	x
Eunotia	x					x	x					x
Fragillaria[b,e]		x	x		x		x					
Gomphonema											x	
Melosira[b]			x	x	x	x						

TABLE 3 (continued). Summary of phyto-plankton collections.

Sample point	River Plankton							Off-River Plankton				
	1	2	3	4	5	6	7	A	B	C	D	E
Navicula[b,d]	x			x	x	x	x	x	x	x	x	x
Nitzchia[c]		x	x		x	x	x	x				
Pinnularia						x	x		x			
Stauroneis[e]				x	x	x						x
Stephanodiscus[e]			x		x							
Surirella[d]						x						x
Synedra[a,b]	x	x	x	x	x	x	x	x	x		x	x
Tabellaria[a,b]			x		x							

FOOTNOTES. The following notations refer to the general classifications given in A.P.H.A., Standard Methods, 1971, Algae Color Plates A through F, opposite page 834:

a. taste and odor algae

b. filter clogging algae

c. polluted water algae

d. clean water algae

e. plankton and other surface water algae

f. algae growing on reservoir walls

TABLE 4. *Summary of zoo-plankton collections*. The symbol x indicates identification of the genus listed at each point.

Sample point	River Plankton							Off-River Plankton					
	1	2	3	4	5	6	7	A	B	C	D	E	F
PROTOZOANS unidentified		x	x	x	x	x	x	x		x		x	
ROTIFERS													
Euchlanis	x	x	x	x	x	x	x	x			x	x	
Gastropus		x	x	x		x	x	x			x	x	
Keratella		x	x								x		
Mytilina		x										x	
Notholca		x				x	x						
Philodina				x									
Platyias											x		
Synchaeta				x	x								
Trichocera		x		x		x							
FLATWORMS unidentified			x	x									
ROUNDWORMS unidentified	x	x		x	x	x				x		x	
CRUSTACEANS													
Cladocerans													
Ceriodaphnia									x		x	x	
Chydorus	x	x	x	x		x	x		x	x	x	x	
Daphnia				x								x	x
Eurycerus	x					x						x	x
Macothrix												x	
Simocephalus	x	x											x

TABLE 4 (continued). *Summary of zoo-plankton collections*.

Sample point	River Plankton							Off-River Plankton					
	1	2	3	4	5	6	7	A	B	C	D	E	F
CRUSTACEANS (continued)													
Copepods													
Canthocamptus		x					x	x				x	x
Cyclops	x	x		x			x		x				x
Diaptomus					x								
Nauplius larvae		x		x	x	x	x		x		x	x	
Ostracods unidentified		x	x	x		x			x			x	x
Isopod unidentified									x				
ARACHNIDS unidentified spiders							x					x	
INSECTS													
unidentified beetles				x								x	
Dipteran larva	x	x		x		x	x	x	x			x	
Dragonfly nymphs		x							x		x	x	
Mayfly nymphs			x	x				x	x				x
Stonefly nymphs		x	x	x				x			x		x
VERTEBRATES													
Fish fry	x								x				

TABLE 5. Summary of collections of bottom organisms.

Sample point	Description of collection
2.	River, mud-sand bottom, current 2 feet per second. A one square foot sample in 1-2 foot deep water was negative.
3.	Inlet off river, mud bottom, no current. A one square foot sample in 1-2 feet deep water was negative. River, mud bottom, current 1.8 feet per second. A one square foot sample in 1 foot deep water was negative.
C.	Pool recently isolated from river, mud bottom, no current. A one square food sample in 1 foot deep water contained 1 mayfly nymph and 5 roundworms. River, mud bottom, current 1.5 feet per second. A one square foot sample in 1 foot deep water was negative.
D.	Oxbow, mud bottom, no current. A two square foot sample in ½-1 foot deep water contained 5 mayfly nymphs(equivalent to 27 organisms per square meter) with a dry weight of 146.6 milligrams (or 7.83 grams per square meter, or 14 lb/acre) River-bank mud. A two square foot sample from the bank and from water ½ foot deep contained 21 roundworms, and 1 bloodworm (*Chironomous*). This is equivalent to 116 organisms per square meter. Dry weight was 1 milligram (or 5.25 mg/m^2, or 0.1 lb/acre).
E.	Pool recently isolated from river, mud bottom, no current. A two square foot sample in 3-inch deep water contained 1 *Chironomous* larva. River bank, 1-inch deep mud covering gravel-mud. A two square foot sample contained 1 *Chironomous* larva.

TABLE 6. Summary of periphyton collections.

Sample point	Description of periphyton
2.	Algae clinging to dead branches in the river was *Cladophora* harboring many diatoms (exclusively *Diatoma*), a few roundworms, a few rotifers, some *Spirogyra*, and *Pleodorina*.
3.	Algae clinging to dead branches in the river was *Cladophora* harboring *Spirogyra* (in reproductive condition) and numerous diatoms (mostly *Diatoma*, many reproducing). Scrapings of surfaces of rooted plants and of dead branches in river yielded many diatoms.
6.	Algae clinging to immersed branches in river was *Cladophora* harboring several dipteran larvae.
C.	Algae masses on dead branches in river were *Cladophora* harboring some *Spirogyra* (in reproductive condition), and many diatoms (exclusively *Diatoma*, many in reproductive condition).
D.	Scrapings of surfaces of rooted plants and of dead branches in the river yielded green algae (*Closterium*, *Spirogyra*, *Zygnema*); blue green algae (*Anabaena*); diatoms (*Diatoma*, *Synedra*, *Cymbella*, *Navicula*); rotifers (*Gastropus*, *Euchlanis*); and dipteran larvae. Algae masses clinging to branches were *Cladophora* harboring mostly *Diatoma*.
E.	Masses of algae clinging to submerged branches in river were *Cladophora* which harbored some green algae (*Spirogyra*, much in reproductive condition); diatoms (primarily *Diatoma*, many in reproductive condition); rotifers (*Euchlanis* and *Gastropus*); and dipteran larvae.

TABLE 7. Rooted plants and algae of quiet water.

Sample point	Description of collection
3.	The algae masses in the inlet were mostly *Spirogyra*. Rooted vascular plants were mostly *Potomogeton sp.*
C.	In the pool, rooted plants included *Sagittaria*(predominant), *Potomogeton sp.*, and *Acorus*. Algae masses in the pool were mostly *Spirogyra*, some in conjugation.
E.	Rooted vascular plants in the pool were *Sagittaria*, *Pontederia*, *Acorus*, and *Myriophyllum*.

DISCUSSION

A. Source of Humboldt River plankton.

It was noted early in the study of river limnology (Kofoid, 1903) that plankton of the channel of a river comes in large part from sources other than the river itself. Kofoid found that Illinois River plankton was uniformly distributed, that the plankton of the river channel was subject to great seasonal and annual variations, and that most plankton production occurred in impoundments and lakes rather than tributaries of the Illinois River. Kofoid (1908) further distinguished river plankton (potamoplankton) from that found in lakes (limnoplankton) and ponds (heleoplankton). Potamoplankton is characterized as polymixic because of a mingling of planktons from all sources in the drainage basin; it is subject to extreme fluctuations in quantity and constitution; and it is not characterized by any species peculiar to it nor by any precise assemblages of organisms. It is distinguished by the greater proportion of littoral or benthic forms which are mingled with the more typical plankters.

Coker (1954) characterizes river plankton as coming from places higher in the river, such as drainage from marginal pools, backwaters and swamps; river plankton is not characteristic of a stream and consists of forms such as small crustaceans, rotifers, and some insect larvae and nymphs which are continually drifting in from backwaters and tributaries. The capacity for survival of the introduced organisms and for their reporduction in the river is limited, particularly in faster moving rivers.

Humboldt River plankton can be characterized much like the plankton of other rivers, that is, it appears to be a mixture of organisms from other sources. Plankton was qualitatively similar from a point 4 miles east of Elko to a point in Carlin Canyon about 14 miles west of Elko. The organisms making up the plankton are those which are found in quiet waters (the micro-crustaceans, rotifers, some algae, some insect nymphs) or the bottom (roundworms, dipteran larvae). Humboldt River plankton probably is a mingling of organisms from several sources: (1) oxbows, (2) return-flow from irrigated fields and meadows upstream, (3) pools along the river, (4) bottom organisms swept into the current, (5) tributaries and (6) contributions from terrestrial plants.

The Humboldt River normally is at highest water levels during June, with relatively high water during March, April and May (Nevada Division of Water Resources, 1974; U.S.D.I. Geological Survey, 1972). During the present study, river levels reached a high point for June at the first of the study and then declined as the study progressed (footnotes, Table 1). It is during periods of high water that oxbows and pools along the river would be connected to the river, and it is during these months that water is returned to the river from irrigated fields and meadows. Probably the great variety of plankton identified in this study (Tables 3 and 4) can be attributed to relatively high water during the study.

Throughout July, the level of the river decreases, and is normally very low during August through February. During low water months, sources which contribute to river plankton would be cut off. At low water stages, river plankton would probably be indigenous to the channel itself. Such a phenomenon has been noted by Kofoid (1903) during low water stages of the Illinois River. In addition to the low water factors which cut off contributing sources, Nevada water rights laws require termination of irrigation above Elko: August 15 for harvest crops, June 15 for meadow pasture, and May 15 for diversified pasture (Nevada Division of Water Resources, 1974). Most return flow to the river as a result of irrigation would be terminated by early summer to cut off plankton production from this source.

B. Quantity of Humboldt River plankton.

Quantitatively, the river contained only about 3 grams living plankton per 10^6 cubic feet of water (Table 2) or only a few hundred organisms per cubic meter. These estimations are difficult to compare with other river studies, for example that of Roach (1932). His studies on the Hocking River in southeastern Ohio showed the population of all plankters to be 5 billion/m^3 in the autumn, 2½ billion/m^3 in winter, and 600 million/m^3 in spring. In comparison to these figures, the plankton content of the Humboldt River in Elko during June appears to be relatively dilute.

Whether or not plankton content might become quantitatively greater during low water/high temperature months late in the summer is open to further study. If plankton did quantitatively increase, it probably would reflect organisms indigenous to the river rather than contributions from sources in the drainage area.

C. Production of plankton within the Humboldt River.

Plankton production within the river itself during higher water stages is probably small. Some sources of production in the river probably include contributions from the green algae and some diatoms. Cladophora was commonly found in masses clinging to various substrates in the river, and this green alga has been noted to endure substantial losses of material with the capacity for rapid replacement through growth (Butcher, 1933). Diatoms may contribute to the productivity in the river, since several genera particularly Diatoma were usually found in association with periphyton (Table 6). Diatoms are considered important producers in fast regions of upland streams, and are usually found abundantly on submerged objects such as stones and plants (Reid, 1961). Butcher (1933) noted that the large rooted plants of smaller rivers act as a habitat for animals and algae and largely determine the fertility of the river. However, the Humboldt River in Elko has few large rooted plants, so that its fertility in this respect is limited. Other than sources of production within the river itself which are relatively insignificant, most of the plankton probably comes from external sources.

D. Significance of the plankton.

Standard Methods (A.P.H.A., 1971) contains a classification of various kinds of common algae. Of the algae identified in this study (footnotes, Table 3), 7 genera are taste and odor algae; 15 are filter clogging algae, 8 are polluted water algae, 7 are clean water algae, 10 are plankton and other surface water algae, and 5 are algae which grow on reservoir walls. The river and quiet waters associated with the river thus appear to contain a mixture of algae of the various classifications, so that no great significance can be attached to classifying the river based on indicator organisms. If the assumption is correct that the river at high water levels contains plankton derived from sources other than the river, than such forms which are examples of pollution indicators mean very little in view of the fact that a variety of clean water and other algae were also present (Table 3). The observations most simply mean that some sources of pollution may be entering the river, perhaps return-flow from grazed meadows. If the assumption is correct that plankton production within the river is endogenous when the river is at low levels during the late summer and the winter months, then the concept of indicator organisms might take on some meaning. For example, Oscillatoria is a notable example of a pollution indicator (Reid, 1961), rotifers in general have a toleration for pollution (Coker, 1954), and diatom populations are reduced by pollution (Berg, 1966). Heavy pollution could result in large bottom populations of sludge worms or chironomid larvae (Coker, 1954).

The significance of plankton can also be considered in terms of food chains. The following discussion has most significance for ponds, lakes and other quiet water. Diatoms and other microscopic algae form the base of a food chain; rotifers feed on diatoms, protozoa and bacteria and in turn constitute one of the basic food supplied for small animals. The micro-crustaceans (cladocerans and copepods) are the chief consumers of minute algae and protozoans, and they in turn become the main food supply of the next larger animals including young fish. Dipteran larvae play a role in converting organic detritus and algae into food for fish Other potential sources of fish food are mayfly and dragonfly nymphs, many of which are carnivorous and feed upon smaller animals, some of which are plant and detritus feeders (Coker, 1954; Reid, 1961). Fish food could also come from trees or shrubs which overhang the river and furnish insects or their larvae (Folkerts, 1973). Most of the events in this food chain probably occur in quiet waters, so that most of the food for fish in the Humboldt River during high water has probably come from sources other than the river. Berner (1951) noted that a substantial quantity of food found in fish stomachs had been produced outside of the lower Missouri River.

E. Bottom organisms. The principal benthic organisms found in the Humboldt River were roundworms, dipteran larvae, and mayfly nymphs (Table 5). Sample point 5 which included the oxbow and a section of river near the oxbow, was the most productive area sampled. Yet when compared to other studies (Table 8), the benthos of the Humboldt River appears to be very non-productive; and the oxbow bottom is only moderately productive compared to several rivers in the United States. Probably the primary reason for the relative non-productivity of the Humboldt River is the nature of the bottom which is mostly mud, or sand-mud. Such bottom environments are generally less productive than other bottom types (Footnotes, Table 8 ; Kittrell, 1969).

The bed of a river is the slowest part of a river to develop. The changes toward the development of a substrate similar to that in a natural river bed occur faster in slack water areas than in areas of fast moving water (Berg, 1966). Rechannelization of the Humboldt River in Elko would cause major changes in the existing river bed, but biological disruptions would be minimal because of the low productivity.

SUMMARY

A limnological survey of the Humboldt River in the vicinity of Elko, Nevada was done during June 1974. Phyto-plankton collections from the river and associated quiet waters yielded 6 genera of blue-green algae, 22 genera of green algae, and 17 genera of diatoms. Zoo-plankton collections yielded 9 genera of rotifers, 6 genera of cladocerans, 3 genera of copepods including their nauplii larvae, ostracods, an isopod, some flatworms and roundworms, and larvae and nymphs of 4 groups of insects. Humboldt River plankton, with the exception of some diatoms and some green algae, is probably not produced within the river itself at high water, but represents a mingling of plankters produced from several other sources: oxbows, return flow from irrigated fields, pools along the river, bottom organisms swept into the current, tributaries, and material contributed from terrestrial plants along the river. At higher

TABLE 8. Quantitative comparison of benthic organisms of the Humboldt River with benthic organisms of several other rivers.

Reference		# organisms per m^2	dry wt of organisms (grams/m^2)	dry wt of organisms (lbs/acre)
Table 5. Humboldt River, Elko, Nevada June, 1974	oxbow bottom	27	7.83	14
	river bottom	116	0.005	0.1
[a]Denham, 1938 White River, Indiana		1437	----	----
Eddy, 1966 Upper Mississippi River in Minnesota		----	9.24	----
[a]Ludwig, 1932 Hocking River, Ohio		836	----	----
Maciolek and Needham, 1951 Convict Creek, California		----	----	summer range 68-197
[a,b]Murray, 1938 average of 33 northern Indiana Streams		2101	----	----
Needham and Needham, 1962 Waddell Creek, California		----	----	200 fall, 470 May, 70 after severe flood.
Klamath River, California		----	----	5,000
O'Connell and Campbell, 1953 Black River, Missouri		----	0.455	----
Richardson, 1921 Illinois River, Illinois		----	----	range 10.4-555
Stehr and Branson, 1938 Hocking River, Ohio		180 spring 777 fall 39 summer 12 winter	----	----

Footnotes.

a. Observed that sand was the poorest benthic environment.

b. Observed that gravel bottoms were more productive than mud, gravel-sand, or sand bottoms; and that vegetated areas were more productive than barren ones. Wene (1940) found that clay-loam bottoms contained the greatest number of organisms.

water levels during June, the plankton content appears to be relatively dilute (about 3 grams living plankton per 10^6 cubic feet of water, or only a few hundred organisms per cubic meter). The plankton in June provides no clear "indicator" organisms because of the contribution from several sources. However, it is believed that during lower water stages of late summer and winter, plankton production in the river will be more endogenous so that plankton content will be more representative of the river itself. This concept needs further study.

The bottom environment of the river in Elko is mostly mud or mud-sand, or in places several inches of mud overlaying a gravel-mud base. Much of the bottom appears sterile, while the more productive areas contained only a few roundworms and dipteran larvae.

COMMENTS ON THE POTENTIAL ENVIRONMENTAL IMPACT OF THE ELKO DEMONSTRATION RAILROAD RELOCATION PROJECT

A. Effect on the river between first and tenth streets.

The Humboldt River in the vicinity between first and tenth streets is a proposed site for rechannelization of the river. The present channel during high water months is essentially non-productive for plankton and bottom organisms. The dilute plankton has probably come from several sources upstream. There are relatively few places which can be called pools or ripples, relatively few rooted aquatic plants, and few other areas which can support a periphyton which contributes to river fertility. Terrestrial vegetation along the bank may contribute some organic matter to the river, but at time of low water, these contributions would be minimal on the several hundred yards of river under consideration. The environmental impact caused by rechannelization would have minimal influence on the biological characteristics of this section of river.

B. Effect on the river downstream from first street. For reasons discussed above, rechannelization would cause minimal impact downstream during higher water stages of the river.

C. Mitigation on the environmental impact. Many aspects related to lessening the environmental impact of channelization of the river, such as consideration of current rates, erosion factors, sediment transportation, channel morphology, and relationship of the new channel with the water table, are topics beyond the scope of this report. However, from a biological point of view, it has been pointed out in the literature that ripples in a river are most biologically productive, that rooted vegetation can be important to the fertility of a river, that terrestrial vegetation overhanging the river may contribute to the river, and that certain bottom substrates are more productive than others. Within the economic feasibility of the rechannelization project, and realizing the fact that river productivity may result in insect pests near populated areas, consideration might be given to the artificial creation of factors which would make the new river channel more productive than the existing channel.

If any of the alternative plans of the Railroad Relocation Project involve destruction of existing oxbows, it should be kept in mind that these environments have tremendous potential, not only in the production of pond-type biologic communities, but as a refuge for wildlife.

D. Need for seasonal and quantitative studies.

The one-month study during June, 1974 covered only a period of time during which the water level of the river was relatively high, current rates relatively fast, and temperature moderate. Planktonic organisms were almost entirely exogenous to the river. They represent living material from a variety of sources upstream and do not give a picture of what the river itself may potentially produce at different times of the year. Studies particularly during the low water/high temperature conditions of late summer, and during the low water/low temperature conditions of winter would provide information concerning the hypothesis presented in this report that the river may develop an endogenous plankton during these periods, and that such endogenous plankton might reveal indicator organisms characteristic of the river.

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Appendix 3B

A Limnological Survey of the Humboldt River, Part II, July - August 1974

David N. Emerson, Ph.D

INTRODUCTION

Few biological data exist on the Humboldt River in Eastern Nevada which provide guidelines for making estimations of the impact of environmental disturbances. The Elko Demonstration Railroad Relocation Project in the City of Elko potentially involves the straightening of one or more curves in the river. Channelization involves cutting a new route and the filling in of the natural channel, with associated environmental disturbances. The studies were conducted to provide an estimation of the environmental impact during the high river levels of June compared to the lower river levels, higher temperatures, and slower current rates of August.

MATERIALS AND METHODS

Plankton samples and bottom samples were collected by ordinary limnological methods, or modifications of methods. Identification of organisms employed standard reference works. Sample points were chosen both outside and inside the project area to give a representative picture of the biological conditions of the river. Physical data included estimations of temperature, current velocity, and depth at each sample point. These measurements provided some basis of interpretation as to why various organisms existed in the river.

RESULTS AND DISCUSSION

A. The June Study (Report dated June 27, 1974).

Sample points were chosen upstream from the sewage treatment plant, except for one point a substantial distance downstream from the plant. Plankton collections from the river and associated quiet waters yielded 6 genera of blue-green algae, 22 genera of green algae, 17 genera of diatoms, 9 general of rotifers, 6 genera of cladocerans, 3 genera of copepods including their nauplii larvae, some ostracods, an isopod, some flatworms and roundworms, and nymphs or larvae of 4 groups of insects. The plankton during the high water stages of the river, with the exception of some diatoms and some green algae, was probably not produced within the river itself, but represented a mingling of plankters produced from other sources such as oxbows, return flow from irrigated fields, or tributaries of the river. The plankton content during June appeared to be dilute, probably only a few hundred organisms per cubic meter. The plankton seemed to contain no clear indicator organisms because of the contribution from several sources.

The bottom environment of the river during June exposed mostly mud or mud-sand bottoms. These bottom types were mostly sterile with the exception of a few slightly productive areas which contained only a few roundworms and dipteran larvae.

B. The August Study (Report dated August 23, 1974).

Sample points were chosen both upstream and downstream from the sewage treatment plant. The flow of the river during mid-August was well under 10 cubic feet per second compared to the June flow of approximately 800 cubic feet per second. By the end of August, several areas of the river within the project area in Elko were dry.

1. Upstream from the sewage treatment plant.

Humboldt River plankton during the low water/higher temperature/slower current stages of the river was probably produced endogenously; the primary substrates for production were algae masses in static water (primarily *Spirogyra*) or attached to rocks (primarily *Cladophora*). The major changes in river organisms in August compared to June can be attributed to reduced current rates which allow algae to gain a foothold on substrates, and which decrease water turbidity to allow greater penetration of sunlight; shallow depths of water which allow sunlight to reach the bottom; and higher water temperatures which cause increased growth and reproductive rates.

The low water levels during August exposed bottom environments of mud or coarse sand in places, and in many places, rocks. Rock bottoms were usually productive; sand and mud bottoms were almost uniformly negative. Two general types of habitats were examined: lotic or running water habitats which exhibited different characteristics compared to static water habitats. Both habitat types were moderately productive for several types of macro-organisms, mostly immature insects: caddisfly larvae, mayfly nymphs, dipteran larvae, and beetle larvae. Caddisfly larvae which require well aerated water were found in abundance in lotic situations, but greatly reduced in number or absent in static water. Mayfly nymphs were found in both situations. Dipteran larvae were mostly confined to static water.

Among the micro-organisms associated with bottom conditions were many which are normally found associated with filamentous algae or with stagnant situations. They included diatoms, protozoans, rotifers, gastrotrichs, a few roundworms, several forms of algae, and a few micro-crustaceans. A greater variety and abundance of micro-organisms was found in static water compared to lotic water.

2. Downstream from the sewage treatment plant.

The river takes on different biological characteristics downstream from the sewage treatment plant. The primary algae found in the river was *Scenedesmus denticulatus* which had its origin in the effluent from the treatment plant. In response to the increased organic material entering the river, and probably to modifications of several chemical factors, populations of rotifers, protozoans, blue-green algae, gastrotrichs, and chironomid larvae were found. These populations were different qualitatively and quantitatively from those upstream. Many of the forms found were those typified for stagnant or polluted water.

In areas of running water downstream from the treatment plant, populations of macro-organisms were not changed significantly compared to points upstream; apparently the running water where found is suitable for several insect larvae and nymphs.

POTENTIAL ENVIRONMENTAL IMPACT AND MITIGATION ON THE IMPACT.

A. Impact on the river in the project area from tenth street to the sewage treatment plant.

Potential impact on this section of the river would be minimal.

1. At higher water levels, most of the plankton originates in sources other than this section of river. The bottom environments exposed at this time are unstable and contain few organisms. Rooted aquatic vegetation is sparse, and found in places where slower currents exist. Terrestrial vegetation may contribute to the river at high water, but at low water, this contribution would be minimal.

2. At low water levels, bottom areas of rocks are exposed; these areas are relatively rich with bottom flora and fauna, and a new channel would cause some disturbance. Disturbances of algae forms would be minimal because these plants would be expected to re-establish themselves quickly after rechannelization.

B. Mitigation on the environmental impact. Aspects of mitigation include:

1. considerations of bottom material to include rocks of sizes to create ripples on which bottom flora and fauna could re-establish themselves;

2. considerations of gradient which would maintain current flows in several areas during low water stages of the river;

3. considerations of seeding and planting of grasses and shrubs or trees along the new banks;

4. considerations of maintaining existing oxbow areas which have potential in the production of pond-type fauna and flora, and as a refuge for wildlife;

5. general considerations involving the creation of factors which could make the new river channel more productive than the existing channel, but recognizing that increased river productivity could result in an increase of insect pests near populated areas.

B. Considerations of the river downstream from the sewage treatment plant.

Because of the increased organic load from the sewage treatment plant, the river downstream from the plant shows different biological characteristics compared to the river upstream, particularly at low river levels. Means of mitigation on the environmental impact would be the same as discussed above, with the realization that contributions from the existing plant result in excessive organic matter in the river.

Appendix 3C

Plants and Animals Indigeneous to the Railroad Relocation Project Area

FISHES FOUND IN THE HUMBOLT RIVER SYSTEM IN THE VICINITY OF ELKO

Common Name	Scientific Name
Minnows and Carps	
Carp	Cyprinus carpio
Lahontan Tui Chub	Gila bicolor obesus
Lahontan Speckled Dace	Rhinichthys osculus robustus
Lahontan Redside	Richardsonius egregius
Suckers	
Mountain Sucker	Catostomus platyrhynchus
Freshwater Catfishes	
White Catfish	Ictalurus catus
Black Bullhead	Ictalurus melas
Channel Catfish	Ictalurus punctatus
Sunfishes	
Bluegill	Lepomis macrochirus
Smallmouth Bass	Micropterus dolomieui
Largemouth Bass	Micropterus salmoides

LIST OF AMPHIBIANS AND REPTILES FOUND IN THE VICINITY OF ELKO

Common Name	Scientific Name
AMPHIBIANS	
Boreal Toad	Bufo boreas boreas
Leopard Frog	Rama pipiens
Bullfrog	Rama catesbeiana
REPTILES	
Great Basin Fence Lizard	Sceloporus occidentalis biseriatus
Northern Side-blotched Lizard	Uta stansburiana stansburiana
SNAKES	
Great Basin Gopher Snake	Pituophis melonolencus deserticola
Valley Garter Snake	Thamnophis sirtalis fitchi
Great Basin Rattlesnake	Crotalus vinidis lotusus

LIST OF MAMMALS FOUND IN THE VICINITY OF ELKO

SHREWS

- Merriam Shrew
- Vagrant Shrew

RACOON

WEASEL FAMILY

- Badger
- Spotted Skunk

DOG FAMILY

- Coyote

DEER

- Mule Deer

CAT FAMILY

- Bob cat

RODENT FAMILY

- Yellowbelly Marmot
- Richardson Ground Squirrel
- Belding Ground Squirrel
- Beaver
- Deer Mouse
- House Mouse
- Western Jumping Mouse
- Porcupine

RABBIT FAMILY

- Black-tail jackrabbit
- Pygmy rabbit

LIST OF BIRD SPECIES FOUND IN THE VICINITY OF ELKO*

Herons, Bitterns, Egrets

- Great Blue Heron
- Snowy Egret
- American Bittern

Swans, Geese, and Ducks

- Canada Goose
- Mallard
- Gadwall
- Pintail
- Green-winged Teal
- Cinnamon Teal
- Shoveler
- Bufflehead
- Ruddy Duck
- Common Merganser
- Red-breasted Merganser

Vultures, Hawks and Falcons

- Turkey Vulture
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-tailed Hawk
- Swainson's Hawk
- Rough-legged Hawk
- Ferruginous Hawk
- Golden Eagle
- Marsh Hawk
- Sparrow Hawk

Grouse, Quail, Pheasant, Partridges

- Sage Grouse
- California Quail
- Chukar
- Gray Partridge

Coots

- American Coot

Plovers, Snipe, Sandpipers

- Killdeer
- Common Snipe
- Long-billed Curlew
- Spotted Sandpiper
- Willet

Avocets, Stilts, Phalarapos

- American Avocet
- Black-necked Stilt
- Wilson's Phalarope
- Northern Phalarope

Gulls and Terns

- Gulls
- Forster's Tern
- Caspian Tern

Pigeons and Doves

- Barnyard Pigeon
- Mourning Dove

Owls

- Great Horned Owl
- Short-eared Owl
- Poor-will

*Source: Compiled with the assistance of Alan Flock. Nevada Fish and Game Department

Goatsuckers

Common Nighthawk

Hummingbirds

Broad-tailed Hummingbird
Rufous Hummingbird
Calliope Hummingbird

Kingfishers

Belted Kingfisher

Woodpeckers

Yellow-shafted Flicker
Red-shafted Flicker
Yellow-bellied Sapsucker

Flycatchers

Larks

Horned Lark

Swallows

Violet-green Swallow
Tree Swallow
Bank Swallow
Rough-winged Swallow
Barn Swallow
Cliff Swallow

Magpies, Ravens

Black-billed Magpie
Common Raven

Chickadee

Black-capped Chickadee

Creepers

Brown Creeper

Dippers

Wrens

House Wren

Thrushes, Bluebirds, Solitaires

Robin
Hermit Thrush
Western Bluebird
Townsend Solitaire

Waxwings

Cedar Waxwing

Shrikes

Northern Shrike
Loggerhead Shrike

Starlings

Warblers

Yellow Warbler
Townsend Warbler
MacGillivray's Warbler
Wilson Warbler

Weaver Finches

House Sparrow

Meadowlarks, Blackbirds, Orioles

Western Meadowlark
Yellow-headed Blackbird
Red-winged Blackbird
Bullock's Oriole
Brewers Blackbird

Tanagers

Western Tanager

Grossbeaks, Sparrows, Finches

Black-headed Grosbeak
Evening Grosbeak
Cassin's Finch
House Finch
Green-tailed Towhee
Savannah Sparrow
Oregon Junco
Gray-headed Junco

Appendix 4A

Air Quality Calculations

MAINLINE POLLUTION EMISSIONS

(Horsepower)(distance)(speed)(rate of pollutant emission at throttle setting) = amount of pollutants emitted

- For one eastbound train traveling 15 MPH for three miles, the emissions are 1980 grams of carbon monoxide.
- For an average highway vehicle traveling at 25 MPH, 43.1gm CO per mile[1] or 129gm CO per three miles are emitted.
- For a diesel truck 20.4gm CO per mile[2] or 61.2gm CO per three miles are emitted.

Therefore,

1980gm/129gm = 15 average highway vehicles

1980gm/61.2gm = 33 diesel trucks

For one SP westbound train traveling 35 MPH for three miles, there are 1350gm CO emitted. Using the same average highway vehicle and diesel truck factors the following equivalents are found:

1350gm/129gm = 10 average highway vehicles

1350gm/61.2gm = 22 diesel trucks

YARD POLLUTION EMISSIONS

Pollution from switch engines can be determined as follows:[3]

1. Horsepower-hour = (load factor)(available horsepower)(Hours of usage at load factor)

   6480 horsepower-hour = (0.06 load factor)(3000 horsepower available) (36 hours switch engines activities)

   The horsepower-hours are used in connection with the rate of emission per throttle setting.[1] (3.9gm CO/hphr at full throttle)(6480 hphr) = 25.3Kg CO

---

[1] EPA, Comparison of Air Pollutant Emission Factors, Second Edition, April 1973 pp. 3.1.1-6,-7

[2] Ibid., p. 3.1.5-2

[3] Ibid., p.3.2.2-1,-2

2. (Fuel burned)(Pounds pollution emission/gallon fuel) = emissions
   (70 gallons burned by idling engines stopped for inspection)
   (0.16 lb. CO/gal) = 11 lb. CO

---

[1] National Industrial Pollution Control Council, "Exhaust Emissions From Diesel Locomotives," April 1973, pp. 16-17

Appendix 4B

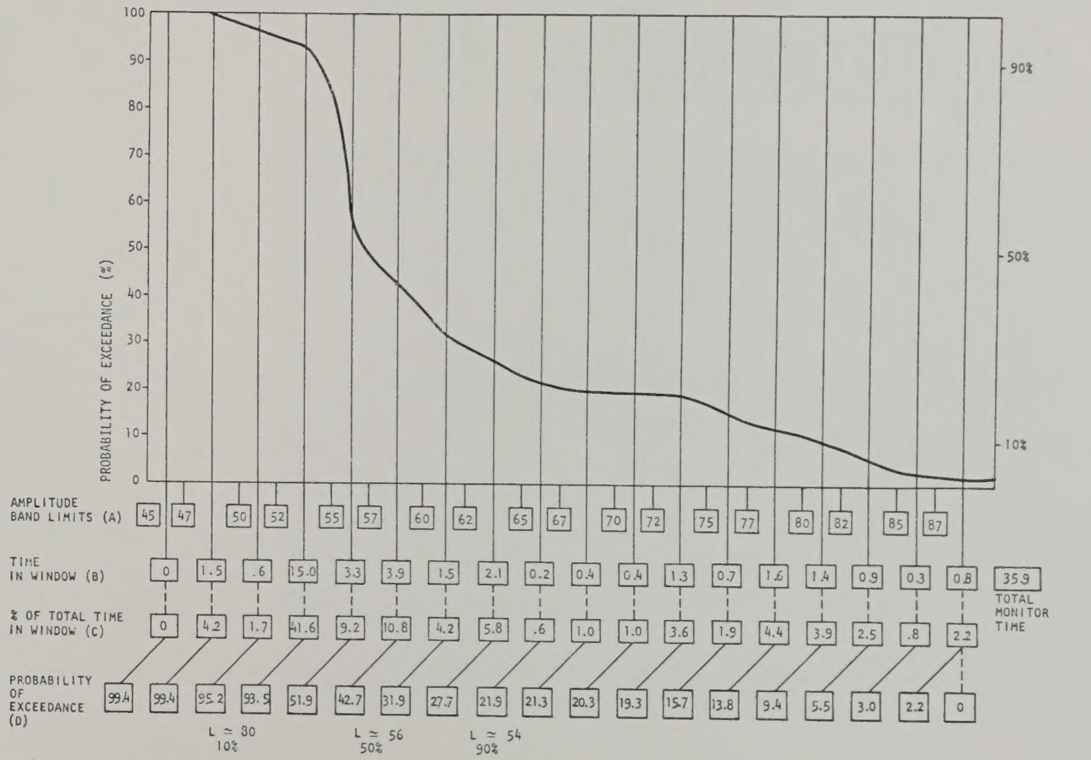
Noise Data and Methodology

The field noise measurements were taken at a dozen sites throughout Elko with an Environmental Noise Classifier, Bruel & Kjaer Type 166. The instrument automatically accumulates the sound level into various amplitude ranges. The readout was recorded and plotted on a Community Noise Computation Chart.

Maxima and minima sound levels were hand-recorded using a Bruel and Kjaer Sound Level Meter Type 2205. These results supplied data for noise levels produced by a single train passage. They differ from the Wyle Lab model noise contours which reflect the effect of train noise on human activities during all hours of the day and night. From hand-recorded measures, the model makes estimates of Single Event Noise Levels (SENELS) for individual operations. The finalized output is in the form of A-weighted, duration-corrected noise contours which account for number of operations and time of occurrence during the 24-hour day. The noise contour scale is based upon A-weighted time-integrated measures of discrete single events (SENELS) and weights their effective impact upon human activity by their time of occurrence. It is called the Day-Night Average Sound Level, with the "day" extending from essentially 7:00 a.m. to 10:00 p.m., and the "night," with a 10 dB weighting penalty, extending from 10:00 p.m. to 7:00 a.m.

The report, prepared in July 1973 by Wyle Laboratories, El Segundo, presents a summary of limitations in developing mathematical models to assess yard and mainline noise. This report, entitled "Assessment of Noise Environments Around Railroad Operations," Report WCR 73-5, was commissioned by the Southern Pacific Transportation Company, Union Pacific Railroad, The Atchison, Topeka and Santa Fe Railway Company and The Association of American Railroads, and was intended to serve as a basic research document from which noise studies at any specific proposed flat yard or on any mainline track could be developed.

DATE: May 23, 1974 START TIME: 10:48 - 11:24 MEASUREMENT LOCATION: 6th & Silver



The chart shows the noise levels recorded by a noise classifier for a 36 minute period. The microphone for the classifier was positioned 100 feet from the Western Pacific tracks at 6th and Silver Streets. The noise from two eastbound trains was recorded. The ambient noise level equals about 56 dBA. The horn noise was recorded in the greater than 87 dBA category but actually reached a maximum of 100 dBA.

COMMUNITY NOISE COMPUTATION CHART

Appendix 4C

Vibration Measurement Methodology

FIELD SURVEY PROCEDURE

Field measurements were taken at 12 locations at 50 feet intervals at cross section from six sections of track. The field instruments used were a Bruel & Kjaer Impulse Precision Sound Level Meter Type 2209, Octave Filter Type 1613, Accelerometer Type 4332 and Integrator Type ZR0020.

A "standard" measuring stick (foot-long reinforcement bar) was driven into the ground at each measurement site. The accelerometer was attached by a magnet to the "re-bar" in a vertical orientation. Vibrations from the train traveled through the ground and were transferred to the "re-bar" then measured by the accelerometer in units of acceleration. The precision sound level meter filtered the vibration through its 11 octave frequency bands which have the capacity for measuring the 31.5 Hz to 31.5 KHz. The recorded vibration levels in the various frequency ranges were compared with criteria levels for human exposure. Table 16-2 classifies the criteria ranges of equal perception and tolerability below 100 Hz. The chart excludes frequencies above 100 Hz since vibrations in the higher range are perceptible mainly on the skin and depend upon the part of the body and the damping layers (clothes, etc.).

GRAPH INTERPRETATION

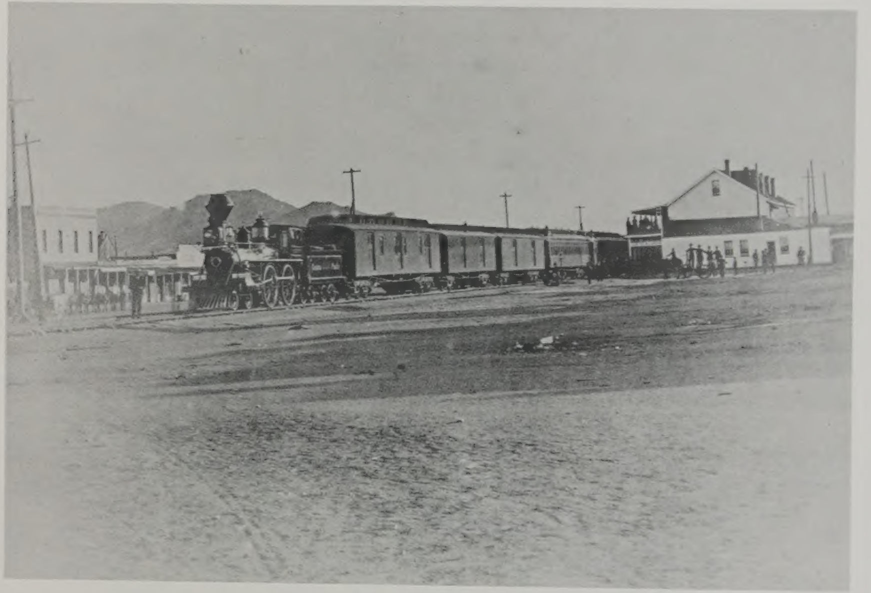
Points were plotted on log-log paper at the center of the frequency bands: 31.5 Hz, 125 Hz, 500 Hz and 1000 Hz for the vibration values in "g" from separate various train passes. The highest values were always obtained in the 31.5 Hz range. They lie within 0.01g and 0.0015g for 50 feet and 200 feet, respectively. This is due to the low frequency content of diesel engine operation. At 50 feet, the highest category is "D" -- very perceptible, but tolerable when living in dwellings with prolonged interruptions. At 100 feet, "C" category is the highest-perceptible vibration is tolerable for living in dwellings with short interruptions. At 150 and 200 feet, the vibration is barely perceptible.

Appendix 5

Historic Report

Victor Goodwin

EVALUATION OF HISTORIC SITES OR STRUCTURES INVOLVED IN THE VARIOUS PROPOSED RAILROAD TRACK RELOCATION ROUTES, ELKO, NEVADA



Central Pacific eastbound train at the Depot Hotel, Elko, 1876.

Victor Goodwin

EVALUATION OF HISTORIC SITES OR STRUCTURES INVOLVED IN THE VARIOUS PROPOSED RAILROAD TRACK RELOCATION ROUTES, ELKO, NEVADA

Victor Goodwin

Author, *The Humboldt, Nevada's Desert River and Thoroughfare of the American West*

Co-Author, *Nevada's Northeast Frontier*

Author, *Chronology of Flood and High Water Years, Humboldt River Basin, 1861-1962*

Author, *Lewis Rice Bradley, Nevada's First Cowboy Governor*

Author, *William C. (Hill) Beachey, Nevada-California-Idaho Stagecoach King*

Author, *The Origin and Development of the Emigrant Trails of Northern Nevada*

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NOTE: ALL PHOTOGRAPHS OF ELKO OF AN EARLIER DAY ARE FROM THE NORTHERN NEVADA HISTORICAL SOCIETY'S COLLECTION. ANY PICTURES OF VERY RECENT VINTAGE ARE THE AUTHOR'S, EXCEPT THE GORDON CAMPBELL PHOTO OF THE SOUTHERN PACIFIC TRACKS AT ELKO IN MAY 1969.

SUMMARY OF THE EVALUATION OF HISTORIC SITES OR STRUCTURES INVOLVED IN THE VARIOUS PROPOSED RAILROAD TRACK RELOCATION ROUTES, ELKO, NEVADA

This synopsis of the historic values involved in the three proposed track relocation routes through the City of Elko -- Silver Street, North Bank, and South Bank -- briefly enumerates and considers the historic aspects of each of the routes. It concludes with a discussion and evaluation of the historic values and stellar historical significance of Elko's irreplaceable link with its stirring past: the original Central Pacific right-of-way -- the Southern Pacific's present alignment -- through downtown Elko, from approximately Third Street east to Twelfth Street.

As a corollary, this discussion of the old Central Pacific right-of-way endeavors to pinpoint the location of structures or sites along that right-of-way which at one time or another played important roles in Elko's growth. Included in this consideration of growth are not only the sites involved in the town's gradual emergence into its present status as eastern Nevada's largest urban area, but also those associated with its early, spectacular burgeoning in the 1860's and 1870's.

This first growth came about, of course, because of Elko's strategic location on the Central Pacific vis-a-vis the diaspora of booming mining camps located both to the northward and southward in eastern Nevada, and most importantly, the gold and silver camps of southwest Idaho. From the very first day of its laying-out in December 1868, Elko became not only the principal point of departure on the railroad for the great hordes of fortune-seeking miners and prospectors who detrained there and headed for the aforesaid mining camps, but also the transhipment point for the enormous mountains of freight and supplies routed to the same destinations.

SILVER STREET ALIGNMENT

This evaluation of historic sites along the Silver Street Alignment covers that stretch of said street from Third Street to Ninth Street.

A. Specifically, there are no pinpoint locations of historic sites or structures on Silver Street which would be impinged upon or destroyed by the proposed realignment route. Briefly, this realignment proposal envisages the relocation of the Southern Pacific trackage from the old Central Pacific right-of-way to Silver Street, coupled with a small southward shift of the Western Pacific mainline tracks now traversing the street.

However, Silver Street played a very stellar role in Elko's youth, and was the focus and focal point for many of the town's early-day activities. As such, it is felt that some consideration should be given to memorializing those bygone scenes and activities by the placement of appropriate markers or plaques along this alignment. Included in this category would be:

1. Missouri Flat -- An interesting and colorful section in the Elko of long ago was Missouri Flat, which extended southward from Commercial Street to the Humboldt River, and eastward from Fifth Street to Ninth Street. Here were parked the huge, high-wheeled "sagebrush clipper" freight wagons which rolled north and south to the satellite mining towns, and here their Missouri mules, their horses or oxen, were corralled or tethered. Here also the jerk-line muleskinners and the bullwhackers, many of them hailing originally from Missouri, pitched their tents and bivouacked between trips to Hamilton, Treasure Hill, Eureka, the Cope District Mines, or the southwest Idaho camps.

In all probability, the name of the area was derived from the home State of so many of these men, as well as their long-eared, hard-tailed charges. Silver Street was the very heart and core of Missouri Flat, and was the means of entrance or departure to or from it. Exiting along Silver Street to Ninth Street, the Hamilton-Treasure Hill-bound freighters found themselves at the Lytton (Litton) Toll Bridge over the Humboldt River (now the Ninth Street Bridge site). After heading southward across this bridge, and over the Hump-Backed Bridge and two other small bridges across old river channels and sloughs south of the main river channel, the sagebrush clippers started down the long desolate reaches of the Gilson Toll Road to the White Pine mines (Hamilton, Treasure Hill, etc.).

If the freighters planned to use the Denver-Shepherd Elko-White Pine Toll Road from Elko to Hamilton, then they exited west from Elko along Silver Street to the Hot Hole Bridge over the Humboldt and thence south over the Elko Hills to Ten-Mile Creek and the South Fork of the Humboldt. If, on the other hand, a freight outfit was headed for the Cope Mines or the southwest Idaho gold and silver camps, it headed west along Silver Street to Third Street, north a few blocks to Idaho Street, and thence to the Elko and Idaho Toll Road across the Adobe Hills (present Mountain City highway).

Pointing up the importance of Missouri Flat in the Elko context of the later 1860's-1870's decade, let us conclude with this comment of the editor of the Elko Independent on December 25, 1869, just short of Elko's first birthday:

> If anyone wishes to see fine teams, let him take a walk out Silver Street, and he will at once realize how important the teaming interest is. The street is blockaded every day with heavy freight teams and wagons.

2. Elko's Chinatown -- From Third and Silver to Fifth and Silver Streets, and south along Fifth Street to the Humboldt River. In the years following the completion of the Central Pacific Railroad in May 1869, and continuing well up into the Twentieth Century, this area was the heart of Elko's Chinatown. The tall flagpole which was so necessary an adjunct to any Nevada or western American Chinatown's observance of the Chinese New Year was located in a small plaza on Fifth Street south of Silver Street. The tong headquarters and the joss house in Elko's Oriental district were both situated on Fifth Street, immediately south of its intersection with Silver. Stenovich Motors is now located on the joss house site, and the Ideal Laundry, immediately west across Fifth Street, is situated where the tong headquarters once stood.

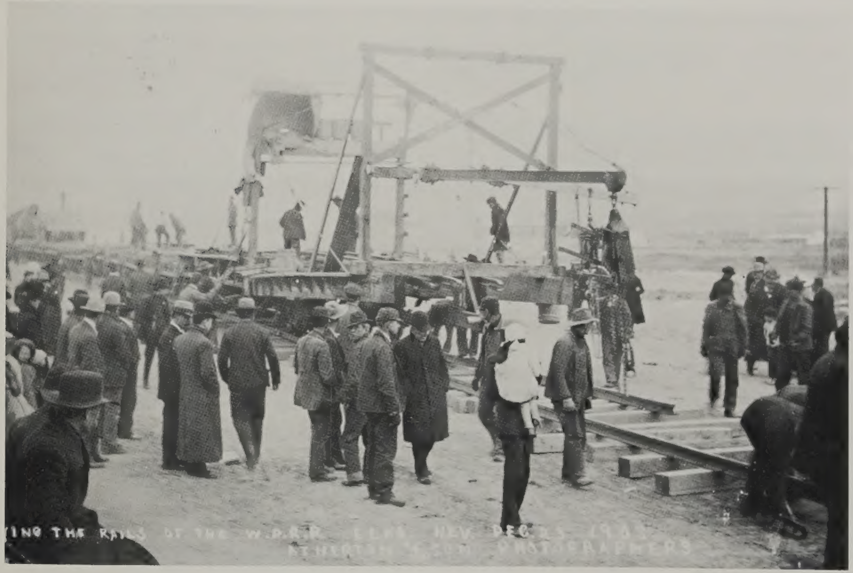
3. The Western Pacific Mainline -- As previously noted, the track relocation plans with respect to the present mainline trackage of the Western Pacific Railroad along Silver Street call for only a slight shifting of the tracks southward from their present location. Accordingly, there need be no consideration of historic values, insofar as the Western Pacifics Silver Street trackage is concerned.

   Furthermore, as Elko's second and more or less Johnny-come-lately transcontinental railroad, the Western Pacific as an entity is not of itself invested with any charismatic patina of great age or historic significance, such as attaches to the original Central Pacific (present Southern Pacific) mainline alignment through Elko.

3A. The Western Pacific Freight and Passenger Station -- The only possible exception to the foregoing statements about the

Western Pacific's historic significance insofar as the Silver Street Realignment is concerned might be the instant structure located at Third and Silver Streets.

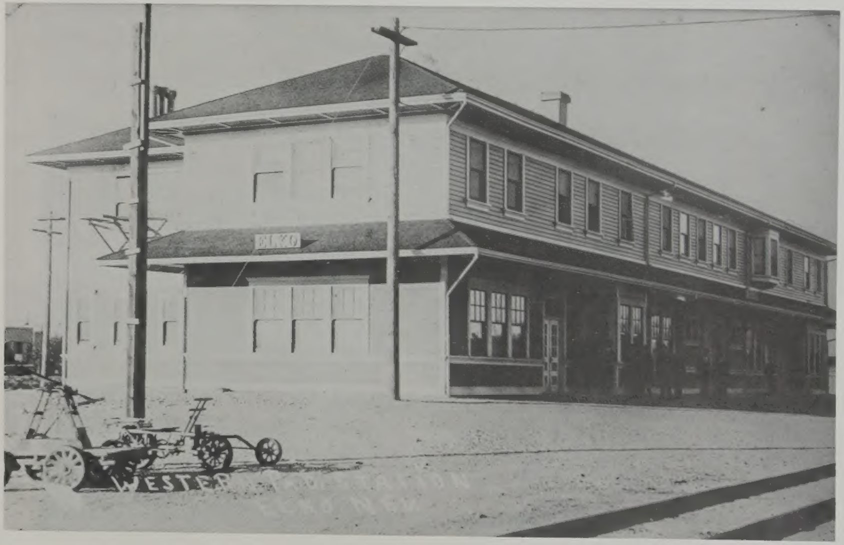
The building is still very much the same edifice as when it was first erected late in 1908, at the time the advancing Western Pacific railhead reached Elko enroute from Salt Lake City to Oakland. A year and a half later, on August 22, 1910, the station was the site of a historic community celebration and general rejoicing. These festivities marked the arrival in Elko of the first "through" passenger train on the Western Pacific, enroute from Salt Lake City to Oakland over the newly completed line.


ING THE RAILS OF THE W.P.R.R. ELKO NEV DEC 23 1908
ATHERTON & SON PHOTOGRAPHERS

Laying Western Pacific rails through Elko, December 23, 1908

During the entire "steam" era, 1910-1949, the building was the passenger station for all the Western Pacific "varnish", including such "name" trains as The Exposition Flyer and The Royal Gorge. After the inception of paired-track service with the Southern Pacific in August 1924, and continuing until that line abandoned passenger service in 1971, it also served as the Elko station for all the Southern Pacific passenger trains eastbound.

With the inception of the Diesel-powered California Zephyr in 1949, the Western Pacific entered upon its most glamorous era of passenger train operation, which continued until the spring of 1971. During that period the Western Pacific station



Western Pacific Passenger and Freight Depot, 1910 served all Elko departing or detraining passengers on the eastbound Zephyrs. Beginning in 1950, the station also served passengers catching or detraining from the Western Pacific's eastbound Budd Rail Diesel Car (RDC), often jocularly referred to as "The World's Longest Streetcar Ride" (Salt Lake City to Oakland).

Since May 1971, with the inception of Amtrak, the U.S. Government - operated passenger train service, the Western Pacific's Elko station has serviced arriving or departing passengers on eastbound sections of Amtrak's San Francisco Zephyr. This passenger train, as its name clearly indicates, is a combination of and successor to two of the Southern Pacific's and Western Pacific's most glamorous name trains: The City of San Francisco and the California Zephyr.

Western Pacific Depot, 1910. (The crowd was celebrating the arrival of the first through passenger train between Salt Lake City and Oakland on August 22, 1910.)

In conclusion, it should be noted that during the entire era of passenger train service, the Elko station also filled a more mundane role -- that of a freight station. It still continues to serve in that capacity.

THE PROPOSED SOUTH BANK ALIGNMENT

An evaluation of this proposed realignment route, which lies largely south of the present Humboldt River main channel, reveals that there are no specific historic sites or structures which would be impinged upon or destroyed along the alignment should it be selected as the final relocation route.

THE NORTH BANK ALIGNMENT

This track realignment involves both the Southern Pacific and Western Pacific mainlines now traversing the Elko townsite from east to west. It would require a straightening of the Humboldt River channel, particularly in southeast Elko from approximately Fifth to Tenth Streets. The relocated tracks of both railroad lines would then be laid on the north bank of the straightened river channel between the aforesaid Fifth and Tenth Streets.

With reference to the foregoing portion of the north bank project, one site or location, of at best dubious historical value, would be directly impacted. Two sites, possessing very valid merit historically, would probably be affected; one at least marginally, and the other totally.

In addition, two sites in the present Western Pacific yard area of Elko might be involved, at least peripherally. They are both located just south of the point where the South Bank and North Bank realignment plans contemplate the rejoining of their proposed Southern Pacific track alignments to the present Southern Pacific main.

Because of the relatively significant importance of these latter two locations in any in-depth chronicling of Elko's past, they are noted and will be discussed here, even through they are of only marginal concern, so far as the main downtown phases of both the North Bank and the South Bank relocation projects are concerned.

The various locations, in the order in which they have been noted in the foregoing paragraphs, are: (1) the site directly impacted, but of dubious or even negative historic merit: Robert F. (Doby Doc) Caudill's rabbit warren of small wooden "apartments" and large, railroad-tie-walled eyesore "museum" occupying the north bank of the Humboldt River channel between Fifth and Sixth Streets; (2) the two sites of valid historic involvement, one totally affected, and the other at least marginally: (a) The Chinese vegetable gardens which once occupied the north bank of the Humboldt River between Third and Ninth Streets, together with their complementary irrigation water wheels in the river itself; and (b) the long-gone Litton (Lytton) Toll Bridge and Toll House, at the site of the present iron truss Ninth Street Bridge; (3) the first of the two sites noted in the third category of locations is the locale of the dismantled Western Pacific roundhouse and turntable, which for many years housed and serviced the Western Pacific's herd of steam locomotives during the halcyon days of the steam-railroading era; (4) the second of these two historically valid but peripherally situated sites is a now rather speculative location in the vicinity of the former roundhouse and turntable area in the Western Pacific yards at Elko. Here was located a short section of graded fill for the once loudly touted and hopefully acclaimed Eastern Nevada Railroad. Construction was begun at this point in 1873 on the new railroad, a narrow-gage line projected to run between Elko on the Central Pacific and the newly booming lead and silver camp of Eureka, approximately 100 miles to the southwest, and onward to Hamilton and the White Pine mines.

A fuller discussion of each of the five sites briefly noted in the foregoing list is appended here. In the discussion of the Litton Bridge and Toll House, the urgent but largely unrecognized need for instituting the preservation of a contiguous historic site -- a still existent section of the historic Gilson Toll Road (Hill Beachey Road) a short distance south of the Litton Bridge -- will be pointed out. Those historically-mined portions of Elko's populance must be quickly alerted to the pressing importance of at once taking steps to insure the preservation of this most historic of toll road sites in the immediate Elko vicinity. The time is now; tomorrow may be too late. By that time, the ruts of the old road may have been forever obliterated beneath the blade of some developer's bulldozer.

Robert F. (Doby Doc) Caudill
and His "Museum" Site

As previously stated in the antecedent summary discussion of the historic sites involved in the proposed North Bank Relocation route, the site of Doby Doc Caudill's Elko operations on the Humboldt's north bank between Fifth and Sixth Streets is incorporated in this inventory. It is so included perhaps more for its minus or negative attributes than for any positive historic values it might have. Certainly, in an aesthetic sense, this half-block area is decidedly on the minus side, and any project or undertaking which might contemplate the removal of its ugly eyesore structures from the Elko milieu once and for all should receive the community's blessing.

Still, as Edna Patterson has remarked in her portion of the history of the City of Elko included in Nevada's Northeast Frontier, Robert Caudill furnished enough color to the Elko scene from 1914 to the 1950's to last more than his lifetime. For his contribution in this regard, perhaps he deserves some remembrance. Most importantly, however, since this area east of Fifth Street marks the site of probably the greatest "rip-off" of historic objects and items ever pulled off or perpetrated on an unsuspecting populace, either in Nevada or elsewhere, it does deserve at least some passing notice, even if in this negative sense.

Mrs. Patterson describes Doby Doc succinctly as having been, at one time or another, a "miner, bootlegger, cowboy, camp cook, and all-around roustabout". She notes that his habitual garb during his Elko days was bib overalls, white shirt, and black bow tie. Such eclectic clothing tastes made him a prominent standout in a community where "bush" or "farmer" attire was frowned upon. According to Mrs. Patterson, Doby Doc customarily greeted all the ladies he met or accosted as "Honey Chile".

Doby Doc made his first big financial killing at Tuscarora in 1919, Mrs. Patterson states. At that time, he went into the bootlegging business, mixing brewer's yeast with corn syrup and allowing the mixture to ferment. The concoction was then stored in charred kegs for a short time - three or four months, usually - and then peddled to thirsty northeast Nevadans. It is reported that Doby's retail prices were relatively modest, but since his "recipe" cost only a dollar a gallong to produce, he made money fast.

With the financial windfall resulting from this illicit but then tacitly accepted or approved means of making a living in the Volstead Era, Doby began in a big way to enlarge upon a sideline enterprise he had first embarked upon in 1914, according to Mrs. Patterson. With great foresight, he began gathering, by hook or by crook, all the pioneer treasures and historical artifacts he could lay his hands upon in Elko County and its adjacent northeast Nevada area. (Mrs. Patterson delicately refers to this rifling process as plucking.)

At first Doby Doc stored his growing collection of artifacts and memorabilia - running the gamut from old cars to log cabins, and from baby buggies to joss houses - at the headquarters of his small ranch, located on the Humboldt's south bank near its confluence with the South Fork.

Eventually he acquired the site in Elko being discussed here, and erected on it a large, ugly, barn-like structure, constructed of old railroad ties and still in place, to house his "museum". In addition, in the 1930's he constructed a cabin camp of primitive one-room structures, crude forerunners of Elko's present-day luxurious and comfortable motel complex. This motley collection of ugly shacks and shanties is also still in place on the site.

During all his historical artifact collection efforts, centered largely in Elko and Eureka Counties, Doby Doc bemused and beguiled the residents and historical memorabilia owners of the area with glowing and expansive promises of the great pioneer museum he would one day erect in or near the City of Elko, to house the treasures he was acquiring from them.

This flimsy structure of glib promises all came down with a crash about 1950, when the old flim-flam artist abruptly and permanently shook Elko's dust from his feet, and departed for scenes more fitted to his propensities and capabilities at Las Vegas. There he opened his Frontier Village, at the Frontier Hotel and Casino on the Las

Vegas Strip, and stocked it with his northeast Nevada historical artifact loot. Not the least of the Village's attractions was an entire narrow-gage train, consisting of a locomotive and cars which Doc had acquired for almost nothing in 1938-1939 from the moribund Eureka-Nevada Railway (originally the Eureka & Palisade Railroad) at Eureka.

With his change of residence, Doc also radically altered his taste in clothing styles, according to Mrs. Patterson - from bib overalls at Elko to white suits, small Stetson hats, and diamond-studded leather boots at Las Vegas.

In the mid-1960's, Doby Doc sold off all his Nevadiana at the Frontier Village. The antique automobiles were acquired by gambling entrepreneur William Harrah for his world-famous collection at Reno, and the Eureka-Nevada train and other northeast Nevada memorabilia were shipped away to far-off Florida. According to Mrs. Patterson, our hero netted a tidy total of $2,000,000 from the transactions.

By his actions in selling northeast Nevada's historical heritage "down the river", Robert F. Caudill achieved his most lasting - and most dubious - claim to fame in Elko. In one fell stroke, he removed from their rightful habitat and setting, probably irretrievably and for all time, priceless and largely irreplaceable historical items and material which should now, by all rights, be reposing in the Northeastern Nevada Historical Society Museum's vaults, files, and showcases at Elko. Therefore, as the prime instigator and perpetrator of this rape - the word is used here not only in its more archaic meaning of wholesale theft or despoilation, but also in its more modern sexual violation connotation - the old "operator" does deserve fitting acknowledgement and recognition for what he did (perhaps perpetrated is a better word) in northern Nevada.

The Chinese Vegetable Gardens

One of the Elko Chinese community's principal sources of livelihood during the summer months was the sale of home-grown vegetables and fruit in season to Elko's white residents. As pointed out in Nevada's Northeast Frontier (p.556), the gardens where all this produce was raised were situated along the north bank of the Humboldt River, from Third Street east to Ninth Street, and centering on Fifth Street, the heart of Elko's Chinatown, along with Silver Street.

These gardens, according to the recollections of old Elko residents, presented a soothing and delightful vista of neatly aligned rows of bright green vegetal growth in an otherwise grey, sagebrush-studded milieu. As such they were greatly appreciated, and their fresh green produce even more so in that vegetable-hungry land.

It is said that the Chinese even raised some sugar cane and other exotic plants in this very hostile environment.

The gardens were all hand-watered, being irrigated with buckets by the Chinese gardeners. The irrigation water was raised from the Humboldt River by means of two water wheels. One of these was located in the river channel just below the Lytton (Litton, Ninth Street) Bridge, and the other in the channel between Third and Fourth Streets. The wheels, fitted with large cups, were turned by treadwheels operated by Chinese footpower. The water they raised from the river was emptied into buckets hanging at the end of neck-yokes, and thence carried to the thirsty gardens suspended across the shoulders of the Chinese irrigators.

The Lytton (Litton, Ninth Street, Lamoille Road) Bridge and Tollhouse

The restructuring and relocation of the Humboldt River channel from

Sixth to Tenth Streets in Elko, as contemplated in this track relocation proposal, would eliminate the present Ninth Street Bridge crossing of the Humboldt River, in use since 1869. It is located on - but considerably elevated above - the site of the original (1869) wooden Lytton (later Litton) toll bridge, which was constructed to carry the heavy freight and passenger traffic on the Gilson Toll Road from Elko to Hamilton and the White Pine Mines over the Humboldt River at this point. According to Milo Taber of Elko, a toll booth or tollhouse was located on the bridge's north approach, on the west side of the road at that point.

This original wooden Litton Bridge continued in use from 1869 until May 1884, first as a crossing on the Gilson (later referred to as the Hill Beachey) Road, and then in the same capacity for its successor, the first Lamoille Road. The wet-mantle system flooding along the Humboldt during May and June of 1884 did not wash the bridge itself away, but destroyed its approaches and supports. On June 6, 1884, the bridge was chained off, and all traffic shunted to the Hot Hole Bridge below Elko.

At that time, the Lytton and Hot Hole Bridges constituted the only crossings of the Humboldt at Elko. It is ironic to note that the Hot Hole Bridge was itself removed from the Humboldt in 1952. The bridge was closed to use in the spring of that year, because it was feared at the time that its lack of height and clearance over the Humboldt River would cause debris accumulation, damming and a resultant flooding of streamside streets and structures in Elko, upriver from the bridge, later that spring and summer. The terrible winter of 1951-1952 was over, and it was fearfully anticipated that any overly-hasty melting of the huge winter snow accumulations piled high on the Mary's River and North Fork watersheds would quickly bring the Humboldt main stem to flood stages at Elko. The Hot Hole Bridge was never returned to service after the closure, being dismantled completely later that year. (The bridge was not destroyed, as one of this writer's co-authors of Nevada's Northeast Frontier has mistakenly stated in that text, because a loaded ore-wagon from the Bullion mines fell through it in the 1940's or early 1950's.)

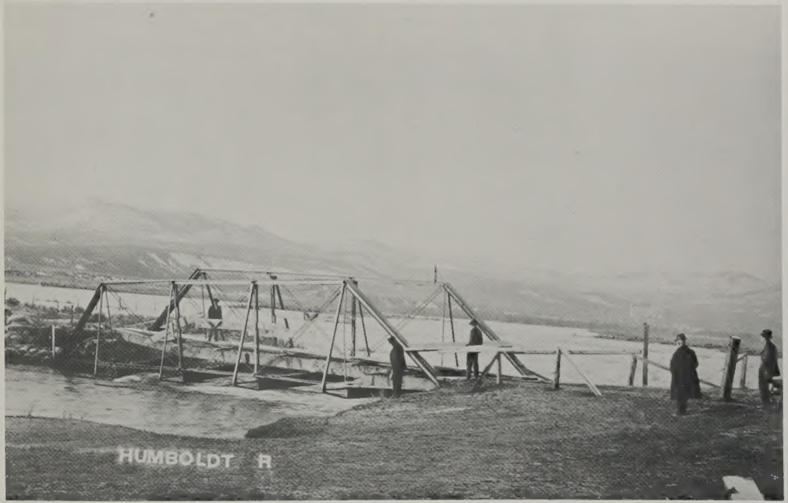
Returning now to the history of the Ninth Street Bridge; the old wooden structure remained closed during the entire summer of 1884. It was finally replaced by Elko County in September of that year with a new iron bridge, using the original bridge's low approaches and abutments. It cost the then princely sum of $755.00.

This second bridge continued in use until the great February-March 1910 wet-mantle floods along the entire Humboldt River system. It was only saved from complete destruction in that flood by removal of all its floor planking and stringers. Even so, the approaches and abutments were washed out, and the bridge itself was knocked out of alignment.

After the 1910 floodwaters subsided on the Humboldt River, the bridge was returned to service again, on its same low 1869 approaches and abutments. This short-sightedness on the part of the City of Elko resulted in aggravated flood damages to the riverside streets and structures in the city from both the April-May 1942 and the January 1943 wet-mantle flood periods on the Humboldt. The lowness of the structure's approach roads and abutments, as well as a lack of clearance between the bridge itself and the water's surface, caused a heavy debris accumulation and damming effect of the river's flow during period of flooding or high water. This resulted in extensive partial submersion of structures on the south side of the river in Elko in 1942. The same situation occurred again in 1943, even though an earthen levee had been constructed along the river's south bank in the summer of 1942.

Following the 1943 flood, the south levee was raised higher, and a levee was constructed along the north bank also. The Ninth Street Bridge itself, and its approaches, were not changed.

Finally, just prior to the anticipated snowmelt floodwater runoff in the spring of 1949, which it was conjectured would be inevitable following the disastrous 1948-1949 "Winter of the Great Haylift", the City of Elko removed the old 1884 iron structure for good. The dreaded 1949 flood never developed, but the bridge was not replaced; not that year or for the next ten years. Finally, in 1959, after a ten-year hiatus with no bridge at all at Ninth Street, the city brought in the present iron king-truss bridge, and placed it on the present abutments. These are much higher, of course, than the original low-clearance approach roads and abutments used from 1869 to 1949.



Ninth Street Bridge, March 5, 1910. The view is upstream; the Adobe Hills are in the background. The planking had been removed from the bridge floor, but the Humboldt floodwaters moved the bridge from its abutments anyway. (See the story of the various Ninth Street bridges in the text)

In concluding this discussion of the history of the various Ninth Street bridge structures at Elko, the reader is adjured not to put himself in such a position that he is unable to see the forest for the trees. That is, in following the twisting convolutions of the history of the bridges themselves, it is all too easy to lose sight of the impressive role the bridges at Ninth Street have played in the ultimate development, not only of the City of Elko itself, but also of that entire immense region south of Elko, now contained in Elko and White Pine Counties. This, not the bridge histories, is the point at issue.

The Gilson (Hill Beachey) Toll Road Remnants

The wheel ruts of a long-abandoned but still excellently preserved section of one of the most storied of pioneer Elko County's stage and freight roads are not strictly within the physical purlieus of this enumeration and analysis. However, the Gilson Toll Road is so much in the near proximity of both the North Bank and South Bank relocations, and possesses such crucial importance as one of the last authentic remnants of Elko's colorful past, that it is included here. The ruts are about all we have left in the immediate Elko vicinity to remind us of those wonderful, rugged, and ebullient times.

In following the wheel tracks climbing the sidehill south of the present Lamoille Road (present Ninth Street prolonged south of that road), it is easy to visualize Beachey's and Len Wines' Concord stagecoaches loaded to their guards with eager fortune-seekers bound for the silver lodes of Hamilton and Treasure Hill, in the White Pine country far to the south. They have just left the Central Pacific's Cosmopolitan Hotel in Elko, and crossed the Lytton (Litton) Toll Bridge over the Humboldt, and the Hump-Back Bridge and two smaller bridges over old sloughs of the river south of the main channel, and are climbing briskly southward out of town, up the steep flanks of the Elko Hills toward Toller (Lamoille) Summit.

As they roll southward in great clouds of alkaline road dust, the stages thread their way quickly through and around long lines of huge "sagebrush clipper" freight wagons, drawn by six, eight, or ten teams of jerkline-driven horses, mules or oxen. These slow, creaking rigs, piloted by swearing Missourian muleskinners and bullwhackers, are enroute to and from Missouri Flats in Elko (and the Central Pacific's great Elko freight houses) and the teeming White Pine mining camps.

The two smaller bridges and the Hump-Back Bridge over the sloughs and former channels of the Humboldt River on that part of the old Gilson Toll Road which is now Ninth Street lying south of the Ninth Street Bridge and north of the present Lamoille Road have long since been replaced by fills to carry the Ninth Street roadway, although the sloughs and channels they once crossed are still discernible. Consequently, there is no reason to be concerned about saving anything on this particular stretch of Ninth Street, save perhaps preserving the memory of the Gilson Road here, and its three smaller bridge structures. This could be accomplished by memorializing them on a placque or marker, which could be located on the North Bank Realignment at Ninth Street.

This placque would commemorate not only the three minor bridges on this portion of Ninth Street, and the various bridges which have been erected across the main Humboldt channel at Ninth Street since 1869,

The flooded Humboldt at Fifth Street, February 1943. The view is south, toward the Elko Hills.

Humboldt flood, Second Street, Elko, February, 1943 but also the Gilson (Hill Beachey) Toll Road itself, the route they were originally built to serve.

That perfectly preserved section of the Gilson Road south of the Lamoille Road, climbing southward for approximately three miles across two spur ridges of the Elko Hills enroute to Toller Summit, is something else again. Every history-minded individual in the City of Elko should be exploring every possibility and exhausting every resource to insure that this pioneer roadway is preserved.

This preservation might be accomplished by obtaining a dedicated permanent right-of-way for the road across any private or public lands involved. Better yet, the private lands could be purchased and the Federal public domain lands traversed by this section of the Gilson Toll Road could be obtained from the Bureau of Land Management for park and recreation use by the City of Elko. In this manner, the lands lying along the road from the present south edge of Elko to Lamoille Summit could be blocked up into a small historical park area, and the ruts of this pioneer road could be kept inviolate. This is similar to what the City of Wells has done with the historic Humboldt Wells, their surrounding meadows, and contiguous sections of the California Emigrant Trail leading into them.

The Gilson Toll Road, along with the Shepherd-Denver (White Pine) and the Elko & Idaho Toll Roads, were all of co-equal importance with the Central Pacific Railroad in Elko's first development. Together, these disparate elements evolved into a transportation system entity which quickly built Elko into the most important shipping and staging point in Northeast Nevada. This discussion cannot concern itself with the two first-named roads, but the Gilson Road is sufficiently within the purview of either the North Bank or the South Bank Realignment alternatives to merit full attention in either proposal, and to warrant the somewhat discursive paragraphs devoted to it here.

As will be indicated in a subsequent section devoted to the proper disposal of the original Central Pacific right-of-way through Elko if the track relocation project finally moves forward to fruition, it is most important that the abandoned C.P.-S.P. right-of-way in Elko be preserved as a public park or parkway. Only in such wise will it be possible to keep inviolate this precious and irreplaceable remnant and reminder of the symbiotic relationship which developed and flourished between a rude eastern Nevada sagebrush village and its railroad creator, to the permanent benefit of both. To this writer, at least, the Elko Hills portion of the Gilson Toll Road south of the Lamoille Road is fully as worthy of permanent protection.

It would be a wonderful thing, indeed, if the Northeast Nevada Historical Society could turn, at least temporarily, a little aside from its seemingly single-minded preoccupation with such fooferaws and fringe areas of historical activity as the accession of more historical artifacts and the proposed enlargement of its museum structure. In their stead, for as long as it takes to get the job done, the Society could vigorously devote itself to the estabilishment of this park area south of Elko, with the rutted trace of the Gilson Toll Road as its prime raison d'etre.

The Site of the Western Pacific's Dismantled Roundhouse and Turntable

The Western Pacific's eight-stall roundhouse (enginehouse) and turntable for turning and stabling its fleet of steam locomotives at Elko have been nothing but fragrant coal-smoke-laden memories for many years. However, the outlines of the roundhouse foundations and the spiderweb tracery of the former trackage leading from the turntable to each of the roundhouse's eight stalls are still visible on the ground in the Western Pacific yards, and present a very distinctive pattern when viewed from the air.

The site of the turntable and engine house lies just south of where the relocated Southern Pacific tracks for both the North Bank and South Bank Realignments would rejoin the present Southern Pacific main line, immediately west of Elko. As previously stated, both these proposed track relocations would probably only peripherally affect the site in question. Furthermore, some historians might question the merit of even classing a turntable and roundhouse in the historical site category.

To this particular historian, however, born and raised in a railroad family and living many years of his early life in a southern Colorado town which was a division point on two major western railroads, such items as turntables and roundhouses are of historical significance. In the Elko instance, they were especially so. They were the trademarks here, as they were wherever they were situated, of the now long-vanished but very beautific time when that most wonderful creation, the steam locomotive, stormed its smoke-plumed way across our land, and laid a pall of coal smoke over every terminal and division-point city or town along the route. Most importantly, however, the Elko roundhouse and turntable represented two of the very few such structures ever built or used in northern Nevada. On the Western Pacific, for instance, the closest similar structures were at Gerlach, the W.P. division point next west from Elko, near the California State Line, and at Wendover to the east, on the Utah-Nevada State Line.

To be sure, the Southern Pacific had large roundhouse facilities at Sparks and Imlay in western and central Nevada, and smaller such facilities at Wells and Montello for their helper engines on the Wood Hills and Pequop Mountains. However, roundhouses and turntables were still scarce enough and unusual enough in the northern Nevada milieu to warrant notice wherever they might have been located. Accordingly, the Western Pacific's Elko turntable and stable for its now vanished droves of iron horses is included here as being of historic merit. It would seem only fitting and proper, to this writer at least, to memorialize this site with a historical marker of some type, to be located on the nearest accessible street or roadway.

The Grade of the Eastern Nevada Railroad

About all that was ever constructed on this largely paper narrow gage railroad project was a short section of railroad grade snaking across the sagebrush and rabbitbrush bottomlands of the Humboldt River, west of Elko. According to information furnished this writer many years ago by Milo Taber, the grade ran southward from the Southern Pacific main line immediately west of town, in the vicinity of the previously dicussed turntable and enginehouse in the Western Pacific's Elko train yards.

The grading and leveling work carried out incident to the construction of the Western Pacific's Elko yard area during the period 1908-1910 destroyed the old Eastern Nevada grade, according to Mr. Taber. However, more for what it caused to happen at other places in the 1870's (as at Palisade, 30 miles down the Humboldt from Elko), rather than what it actually accomplished on its own at Elko, it is included here.

Historical material on this largely mythical little railroad is very hard come by. However, the writer of this paper carried out considerable research on its history several years ago, in the preparation of not only the chapter on transportation in Nevada's Northeast Frontier, but also of his earlier and perhaps even more definitive work, The Humboldt - Nevada's Desert River and Thoroughfare of the American West. The information contained in those two sources, as well as material found in David Myrick's Railroads of Nevada and Eastern California and in Gilbert Kneiss's Bonanza Railroads, has been drawn upon in the preparation of this report. The location map and report of N. Westcoatt, Chief Engineer of the Eastern Nevada, was also inspected in the files of the Nevada Historical Society at Reno.

As noted in *The Humboldt - Nevada's Desert River*, when Eureka, Nevada began to burgeon in 1869 and 1870 as one of the premier silver camps in the American West, Elko, Carlin, and Palisade on the Central Pacific Railroad were all anxious to build railroads to the camp. All three communities already had stage and freight roads to the booming little mining metropolis by 1870, but they were anxious to modernize and speed up their draft-animal-powered transportation systems by constructing railroads to the new mines.

Each of the towns was ambitious, and each longed to become the principal point of departure from the Central Pacific for a railroad to Eureka and onward to Hamilton and Pioche, which were also booming at the time.

Elko, already the principal entrepot and depot for staging and freighting operations to the surrounding mining districts and regions, as previously noted, was particularly anxious to preserve its hard-won preeminence. It got the jump on its two rivals by filing articles of incorporation for the Eastern Nevada Railroad in Carson City on January 20, 1871.

The stated objective of the new corporation was to build a narrow gage railroad (three-foot gage) from Elko to the three previously named mining camps. The line was projected to run southward from the C.P. at Elko along the chain of valleys lying between the Diamond Range on the west and the Ruby Mountains on the east. Its surveyed alignment at times ran close to Shepherd and Denver's Elko & White Pine Toll Road, and at other times closer to the Gilson Toll Road used by the Hill Beachey and Len Wines stages. Eureka was to be reached by a spur line running from upper Huntington Valley through Railroad Pass and along Diamond Valley.

The enabling bill for the projected line passed the Assembly in the Nevada Legislature on February 13, 1871, with an amendment prohibiting Chinese labor. Nevada, along with all the western States and territories, was then beginning to be gripped by a swelling wave of anti-Chinese feeling. The bill passed the Senate the following day, and Governor L. R. "Broadhorns" Bradley, the stocky old cattle baron from Elko, Eureka and White Pine Counties, signed it at the end of the week.

A preliminary survey party was immediately assembled at Elko, and began work under the direction of N. Westcoatt, Chief Engineer. By March 25, 1871, the survey party had progressed up the South Fork and Huntington Valleys as far as Smith Creek, enroute to Railroad Pass, Diamond Valley, and Eureka.

Palisade, which considered itself the natural shipping outlet for the southern mines, hid its chagrin, jealousy and alarm at the rapid fruition of its upriver neighbor's railroad plans under the guise of practical jokes and derision. The Palisade citizens began sending up to Elko packages containing tin toy locomotives and cars. Along with each package, the Palisade people enclosed mockingly pious adjurations to the effect that their Elko friends should keep the toy trains for use on their new narrow gage railroad after it was completed. (*Elko Independent*, March 4, 1871.) The editor of the *Independent* promised Palisade that Elko would do just that.

In spite of this brave beginning and great paper plans for the new Eastern Nevada narrow gage at Elko, everything eventually came to naught on the little line. There was a brief flurry of construction activity in 1873 across the Humboldt bottoms west of Elko by the railroad's two principal promoters, Gilmer & Salisbury, the then prominent Utah and Nevada Stage line operators. As previously noted, the construction work consisted of a short section of grade running south from the Central Pacific main line, in what was to become, 35 years later, the Elko roundhouse area and train yards of the Western Pacific Railroad.

Gilbert Kneiss, in the chapter on the Eureka & Palisade Railroad in his Bonanza Railroads, has an amusing description of the construction of this one and only section of the Eastern Nevada at Elko. It seems that the construction "gang" consisted largely of two Chinese and one Shoshone Indian, and that they spent most of their working hours slumbering peacefully in the shade of the large sagebrush bushes along the "right-of-way" (Bonanza Railroads, pp. 82-83).

When it became known to the people of Elko, Palisade, and Eureka that such hanky-panky was going on with regard to the Eastern Nevada, it did not take them long to realize they were all being had. Upon investigation, it devolved that Gilmer & Salisbury were stalling; their plan was to allow their proposed Utah rail line, the Salt Lake, Sevier Valley & Pioche, to build to Pioche and the White Pine mines first, while they were pretending to build the Eastern Nevada. If their scheme were to be carried to fruition, the White Pine traffic would then be drained eastward to Salt Lake City instead of west to San Francisco, and the Eureka mines would be left to shift for themselves.

This bit of chicanery, when it was finally exposed, outraged the citizens of Eureka and Palisade. Without further ado, on November 19, 1873, the narrow-gage Eureka & Palisade Railroad was incorporated by a group of Eurekans, without Governor Bradley's approval or a Eureka County construction bond subsidy. Messrs. Gilmer and Salisbury, abruptly doing an about-face, abandoned their pretensions of grading the Eastern Nevada at Elko, and agreed to aid in the construction of the new line.

Following this 1873 fiasco, no more was heard of a railroad line south from Elko until February-March 1910, 37 years later. At that time, the destruction of almost 30 miles of Eureka & Palisade trackage from Palisade southward up Pine Valley by the great wet-mantle 1910 floods of the Humboldt and its tributaries caused the little 90-mile narrow gage to terminate train service for a then indeterminate period. This hiatus turned out to be for over two years.

During that protracted period of no railroad service at all to Eureka there was talk around Elko and in Eureka of abandoning the flood-devastated Eureka & Palisade altogether, and building an entirely new railroad from the Central Pacific at Elko southward to Eureka. This new line was to be standard gage (4'8½"), utilizing the then still-existent Eastern Nevada narrow gage grade and alignment at Elko.

Running southward from Elko, the new railroad would occupy the surveyed Westcoatt 1871 alignment as much as possible, but be built on much much easier gradients than those of the original Eastern Nevada narrow gage survey. By the construction of such a railroad, the Eureka business and mining traffic would be brought into Elko, where Elkoans thought it rightfully belonged, instead of Palisade. Nothing more was ever done on this proposal, however; it never progressed beyond the talking stage.

After a perusal of the foregoing brief story of the abortive Eastern Nevada Railroad project, it should be patent to the reader that this bit of colorful but now largely almost forgotten early northeastern Nevada history is worthy of some type of placque or marker in connection with the Elko track relocation project. Said marker should be located on the nearest street or public road to the site of the now-vanished Eastern Nevada grade, in the vicinity of the former Western Pacific roundhouse and turntable area.

THE CENTRAL PACIFIC (SOUTHERN PACIFIC) RIGHT-OF-WAY IN DOWNTOWN ELKO

To this writer at least, the most significant part of this study of the impact of the Elko railroad track relocation project on adjacent or peripheral historic sites revolves around the ultimate disposition of the present Southern Pacific right-of-way through downtown Elko. This applies to at least that portion of said right-of-way from approximately Tenth Street west to the present Elko Farm Supply office and warehouse, a short distance west of Third Street.

In this, the concluding section of the historical site impact study, the writer will present his thoughts and recommendations concerning the right-of-way's future use. The recommendations are, of course, predicated upon the eventuality of the relocation project's coming to actual fruition, with the present Southern Pacific main line trackage (which still occupies the original Central Pacific right-of-way) being shifted to one of the three proposed track realignment locations.

To me, there can be no finer ultimate use of the old Central Pacific-Southern Pacific right-of-way through downtown Elko than its permanent preservation as an elongated strip of public park or parkway, beautifully landscaped with grass, trees and shrubs. To turn it into just another addition to that already barren and dreary expanse of asphalt-waste parking lots which presently blight the Commercial Street-Railroad Street scene from Fifth Street west to Third Street would be the ultimate sacrilege indeed.

By being converted into such an urgently needed green space in downtown Elko, the old right-of-way would, of course, vastly improve the area's present practically non-existent aesthetic values. In addition it would of itself constitute a mutely dynamic and expressive historical marker in its own right. As such, it would be an ever-present and living reminder of Elko's pioneer past, and of the vigorous young transcontinental railroad which gave it birth almost 106 years ago.

In discussing this idea with Melvin Steninger, Editor-Publisher of the Elko Free Press several weeks ago, this writer discovered, to his pleased surprise, that his fancied original thoughts about the C.P. right-of-way's preservation were not original with him after all. It seems that in an editoral discussion of the railroad relocation project a year or so ago, Mr. Steninger had made basically the same recommendations; doubtless other community-betterment and history-conscious individuals in Elko and all across Nevada have been thinking along similar lines.

Here again, as noted in the earlier discussion in these pages relative to the preservation of that still-extant section of the historic Gilson (Hill Beachey) Toll Road immediately south of Elko, is a situation made to order for vigorous espousal and promotion by the Northeast Nevada Historical Society, Elko County's official historical entity. Both the Gilson Road and the Central Pacific right-of-way preservation projects should be pushed strongly, not only by the Historical Society, but also by all prescient and civic-minded organizations in the Elko locale, such as service clubs, women's clubs, fraternal orders, and religious groups.

To accompany and complement the transformation of the old railroad right-of-way into a living historical marker of itself, another corollary historical project should be undertaken. Reference is made here to the signing or marking of premier historic sites along or adjacent to the railroad right-of-way with permanent placques or markers. A suggested - but by no means definitive - list follows; lack of both time and space precludes any very extensive fleshing-out of the list beyond much more than a cursory listing here.

In perusing the appended list of sites along the old C.P. right-of-way through downtown Elko, the reader will doubtless be struck with the thought that most if not all of the historic locations are either railroad-originated or railroad-oriented. This of necessity had to be so. As previously discussed, the rude sagebrush village strung along the Central Pacific was a jumping-off place into the vast Nevada and Idaho hinterland which stretched limitlessly to the horizon in all directions. In growing, it pooled its efforts with the vigorous young railroad, its creator, in a mutually profitable symbiosis which enabled both to reach their present healthy maturity.

Because of this symbiotic, intertwining relationship, Elko cannot be described as being, from its origin, strictly a railroad town. As this writer has pointed out in The Humboldt, Nevada's Desert River, the town is often loosely but incorrectly so described.

As first created by the railroad, Elko's primary reason-for-being was as a freight-shipping point and point of arrival and departure for passengers heading north and south from the C.P. rails, as has been emphasized many times previously in this paper. The town in its first 40-odd years of existence did not primarily serve or service the Central Pacific per se. It was not until the arrival of the Western Pacific in 1909, at which time Elko became a division point on this new transcontinental railroad link, that the community became a railroad town, in the purest sense of the word.

Indicative of Elko's railroad-oriented but non-railroad-service status were: (1) the three huge freight depots located south of and alongside the tracks between Fifth and Seventh Streets, constructed in 1869 and the years following; and (2) the Cosmopolitan (Depot) Hotel, situated north of and alongside the tracks between Third and Fourth Streets (the site is now a large parking lot). The freight depots were for the servicing of the huge freighting operations which gave Elko its reason for being. In the same vein, the passenger depot and hotel existed solely for the care and feeding of the stage and railroad passengers passing through Elko, or preparing to embark upon long stage journeys north or south from it. There were no railroad servicing, repair, or maintenance facilities as such.

Research and inquiry by the writer indicate that the Central Pacific did not even have a water tank at Elko until 1874, when it finally completed a well and installed a steam pump and 62,500 gallon water tank north of the main line, near Sixth Street.

As a result, at least prior to 1874 no switch engines or motive power of any kind were permanently berthed at Elko on the C.P. According to Milo Taber, a yard engine made periodic trips from the division point at Carlin, 20 miles down the Humboldt. Its primary assignments were to do the necessary switching work involving the various sidings and spur tracks at Elko, and to refill from its tender the large water barrels kept atop the three big freight depots in case of fire.

When finished with its chores, the switcher would be turned on a small turntable located just north of the tracks at Eleventh and Railroad Streets (early Elko plat maps show this turntable) and return to Carlin with its crew. Consequently, many of the historic sites situated along the C.P.-S.P. main line in downtown Elko reflect this railroad-oriented but non-railroad status of things in the pre-Western Pacific days. Many of them have been noted in the foregoing few paragraphs, but will be repeated again in the following list of sites.

Historic Sites Along or Adjacent to the Central Pacific Right-of-Way

(1) The Cosmopolitan Hotel and the Railroad Passenger Station, located on the north side of the railroad between Third and Fourth Streets. (Later called the Depot Hotel, and finally dismantled in 1904.) The railroad passenger station remained at its original site until the 1950's, when the Commercial Hotel leased its site and paid to have it moved to its present location at Sixth and Railroad Streets. In 1948, while

still at its original location, the old station was rebuilt into approximately its present form. (Information from Roy Mills, former S.P. Freight and Passenger Agent at Elko.)

(2) The three large freight houses, originally located on the south side of the C.P. main line between Fifth and Seventh Streets. Only one warehouse, (Elko Lumber Company), situated near Sixth Street, is now located on this site. However, investigation indicates that this structure is not one of the original 1869-1870 freight houses at Elko, having been built in more modern times. Two of the three other freight houses or storage warehouses now situated on or near the Southern Pacific main line quite possibly date back to the early freighting times in Elko. They are still painted in the old C.P.-S.P. yellow color scheme; one is located on a spur near Twelfth and Commercial Streets (Elko Lumber Company) and the other stands in back of the Silver Dollar Saloon, on Fourth Street south of Commercial Street (Bodily Furniture Company). Another warehouse (Elko Lumber Company also), now located near Tenth on Railroad, has the classic Elko freighthouse form and structure, but appears to be newer.

(3) The sites of the former C.P.-S.P. water tank at Sixth and Railroad and the satellite water standpipe on the station platform between Third and Fourth Streets.

(4) The former C.P. turntable site, just north of the main line tracks at Eleventh and Railroad Streets.

(5) The site of the Elko Roller Mill (originally the Elko Water and Flour Milling Company, in the 1870's) on Commercial Street between Eight and Ninth.

(6) The Mayer Hotel, on Commercial Street between Third and Fourth. The Stockmen's Hotel now covers the old Mayer Hotel site, and much more area besides.

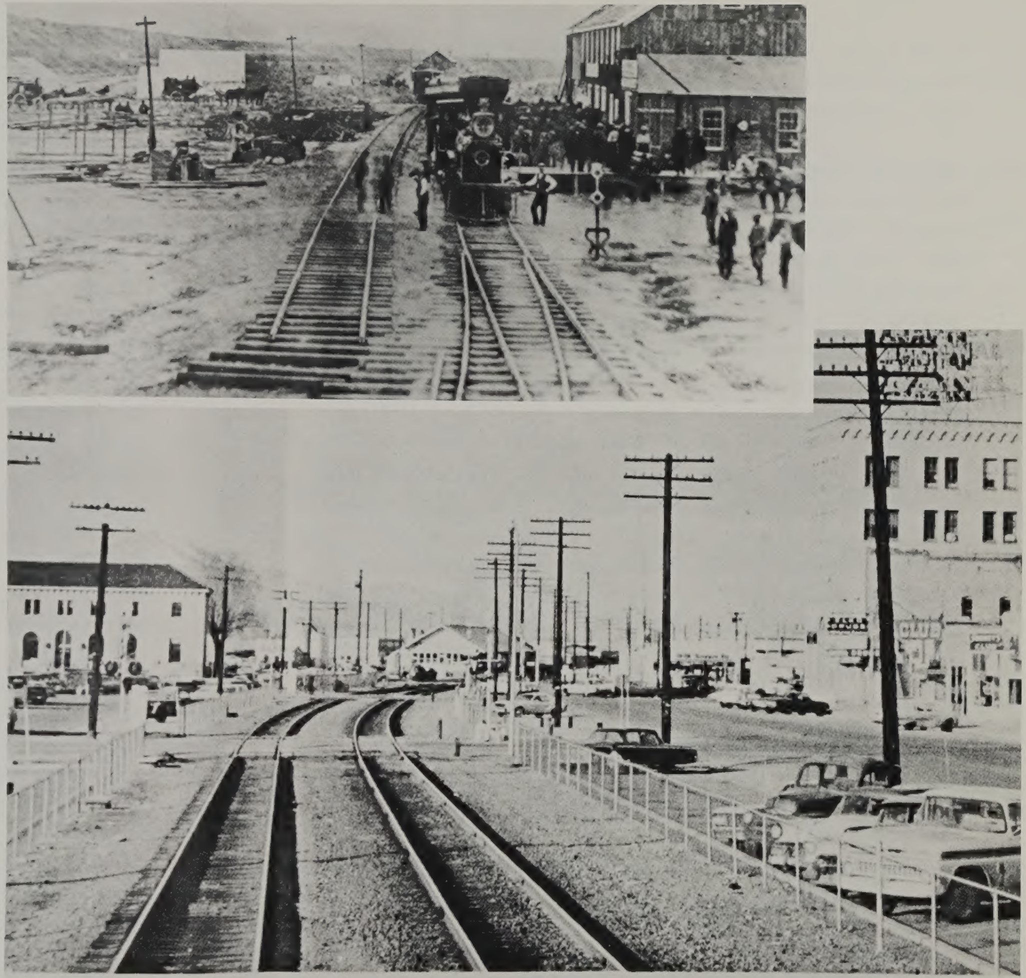
(7) The Commercial Hotel, first taken over and remodeled into much of its present form by Bradley and Dunn in 1903. It soon became Elko's principal hostelry; the present Commercial under the Ellis ownership is much expanded and added to since the 1903 period. The famous Nevada hotel entrepreneur, Newton (Newt) Crumley owned and operated the Commercial in the 1940's-1950's period.

(8) The Verdi Lumber Company office and warehouse, present Elko Farm Supply building, west of Third Street. The instant structure has almost identically the same appearance as when it was first erected by the historic lumber firm in 1914. The Verdi Lumber Company not only furnished the lumber from its Sierra Nevada forest holdings which built many of the central and eastern Nevada mining camps, but it also supplied them with cordwood, coal fuel oil, and even sold them automobiles

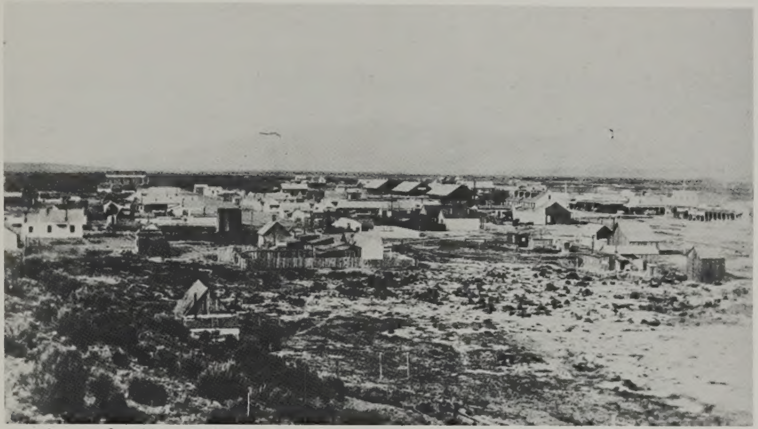
In conclusion, these are no doubt other historic structures and sites on or along the C.P.-S.P. right-of-way through downtown Elko which would merit incluđion here. However, there has to be a stopping place somehwere, and this is it.

The caption of the following two photographs is only partially correct; the two views were not made from exactly the same spot. The May 1869 photograph was probably made from atop the westernmost freight depot, at the Fifth Street crossing, looking toward Fourth Street (the locomotive is standing on the Fourth Street crossing).

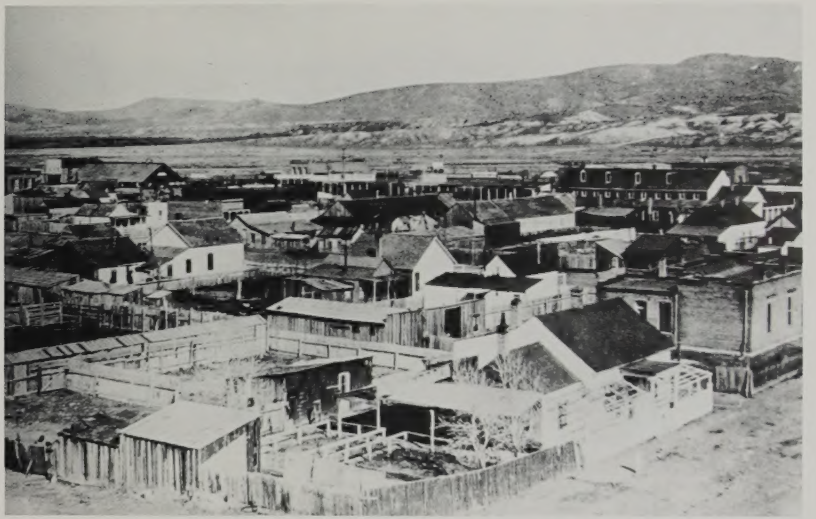
The May 1969 view, on the other hand, was probably made from a Diesel cab or atop a railroad car, about a block farther east of the 1869 view; the Fifth Street crossing appears in the center of the photo. (Note the two Concord stagecoaches in the left background of the 1869 photo. From their position and location, it is surmised that both are Hill Beachey vehicles, loading passengers for the Cope District and southwest Idaho gold fields.)



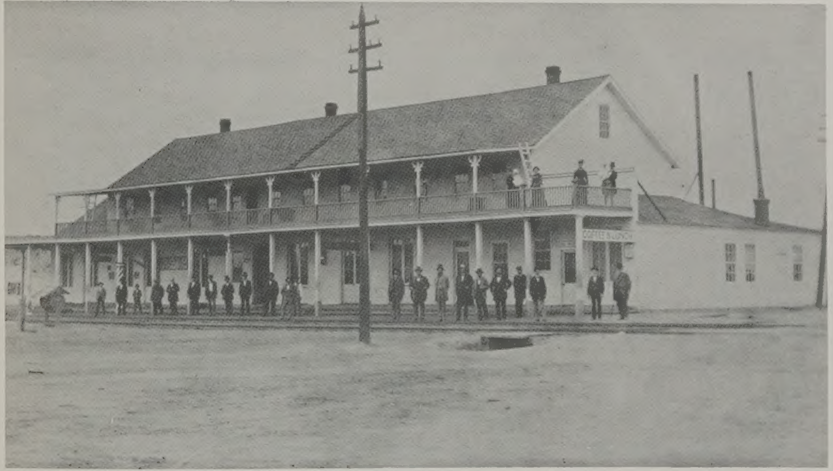
TWO VIEWS OF ELKO from exactly the same spot, exactly 100 years apart. Top photo was taken in May of 1869 by the Central Pacific Railroad and a copy provided by the Southern Pacific Railroad. Bottom photo was taken in May of 1969 by Gordon Campbell. Elko



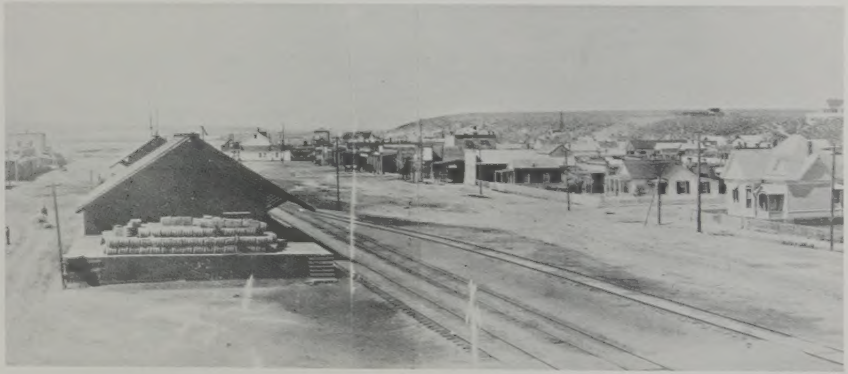
View of Elko, 1876, looking eastward. Note the Depot Hotel and the three C.P. freighthouses along the railroad to the east (left of photo).



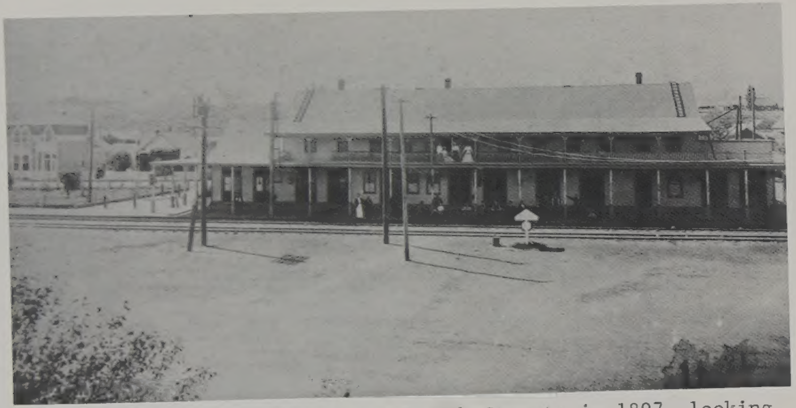
View of downtown Elko in the 1880's, looking south toward the Elko Hills. The Depot Hotel and the Central Pacific Railroad Station appear in the right background, and the freight depot, on the railroad at Fifth Street is seen in the left background.



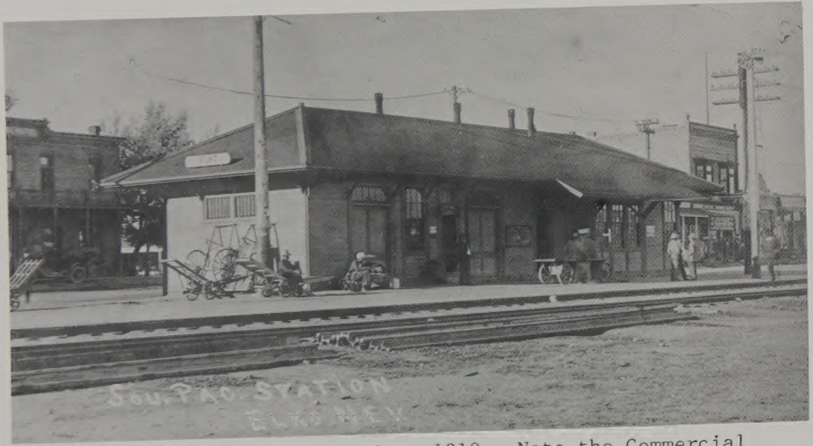
Depot Hotel, 1876, at Fourth and Railroad Streets. (Fourth Street crossing at right center.)



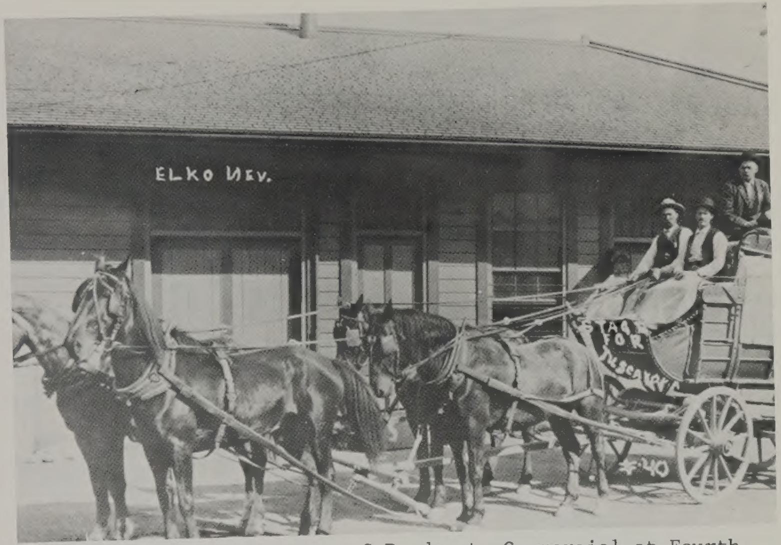
View of downtown Elko in 1885, with the freighthouses between Fifth and Seventh Streets in the foreground. The Depot Hotel is visible in the left background.



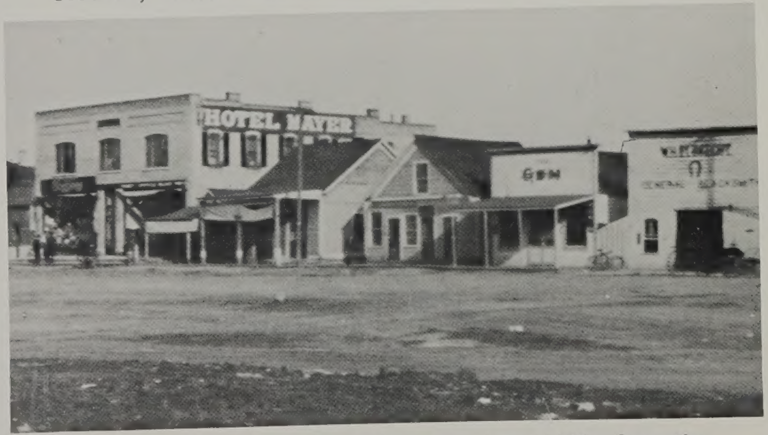
Depot Hotel between Third and Fourth Streets in 1897, looking northward toward the Jefferson Henderson home.



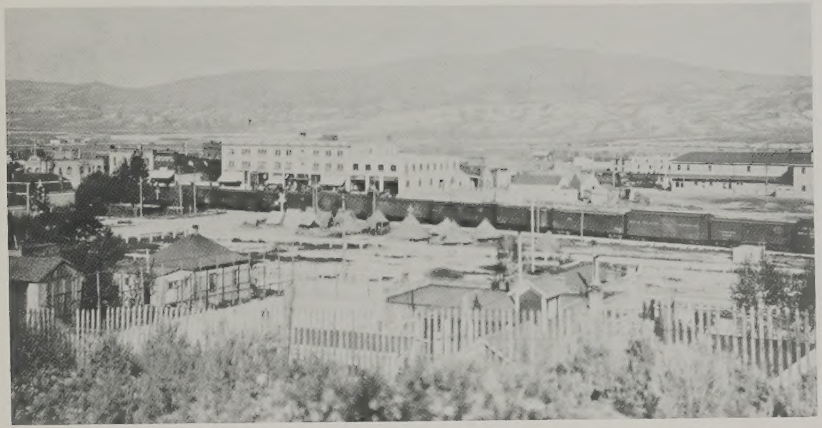
Southern Pacific Depot, circa 1910. Note the Commercial Hotel, in its original dimensions, in the background. (Railroad Street, between Third and Fourth Streets.)



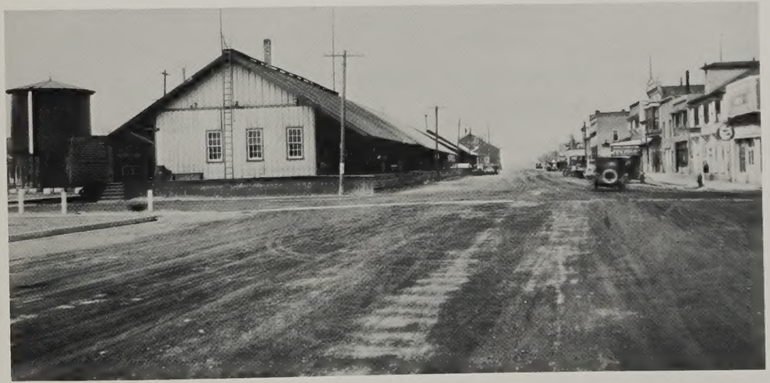
Elko-Tuscarora stage at S.P. depot, Commercial at Fourth Streets, circa 1900.



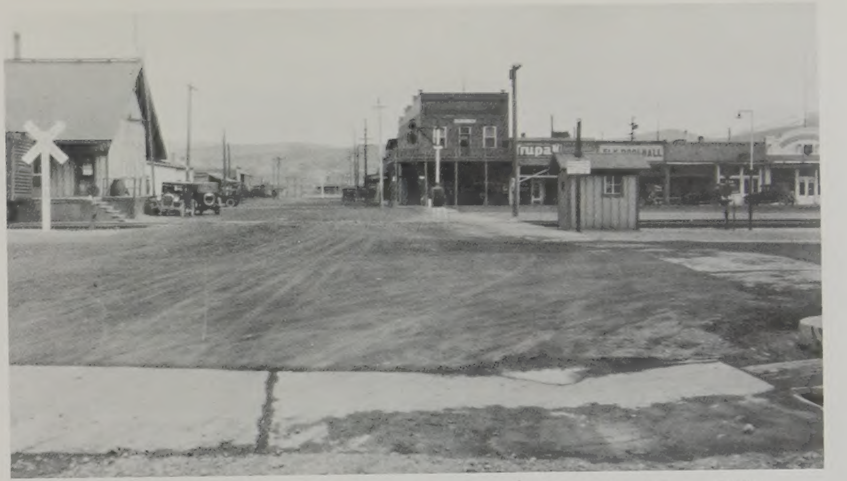
Mayer Hotel, Commercial Street, circa 1900, from the C.P. right-of-way. The Stockman's Hotel now occupies the site of this pioneer Elko hostelry.



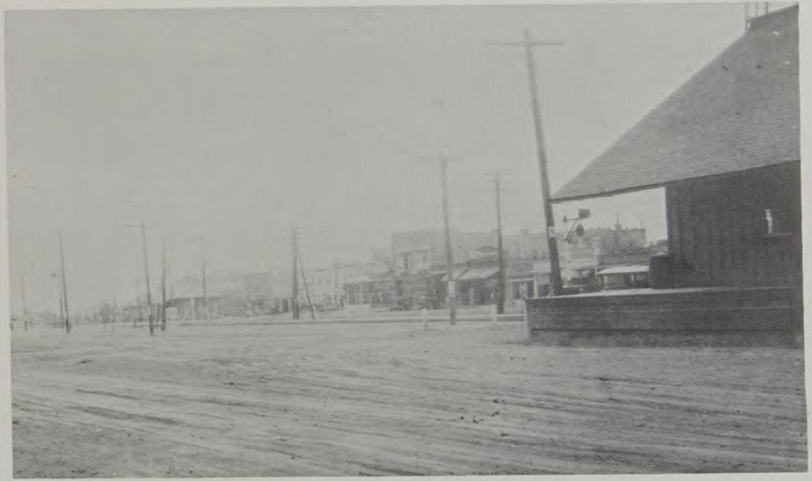
U.S. Infantry camped between the railroad tracks, Elko, 1917, to guard the railroad tunnels between Halleck and Palisade. The Western Pacific station appears in the right background and the Mayer Hotel at the left center (large white building).



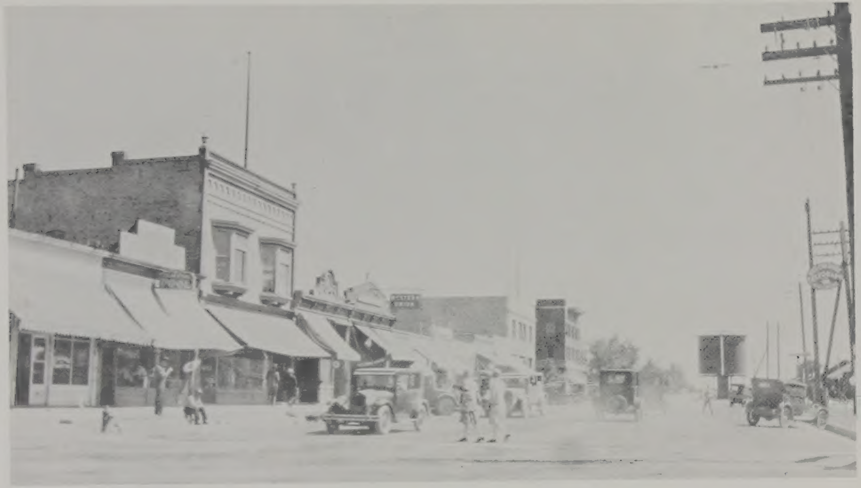
Commercial Street, 1925, showing S.P.R.R. warehouse at Fifth Street. The view is to the east; note the now long-defunct railroad water tank at the extreme left-center of the photograph.



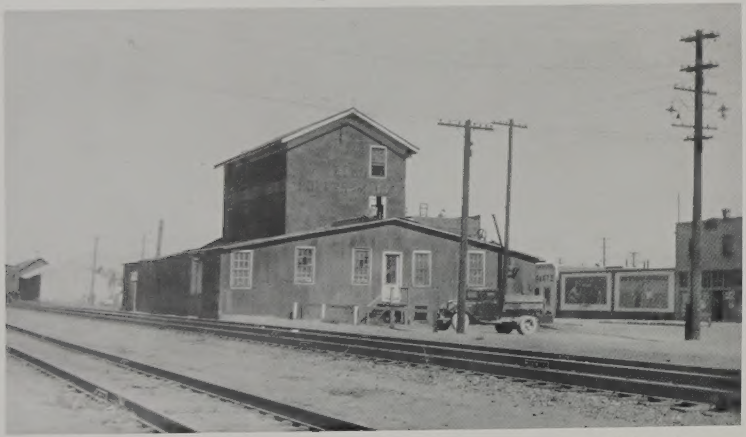
Fifth Street crossing of Southern Pacific main line, 1927, looking south down Fifth Street. Railroad Street comes in at the right center; Commercial Street in the right background. The westernmost of the three railroad freight houses is seen in the left background, across the tracks.



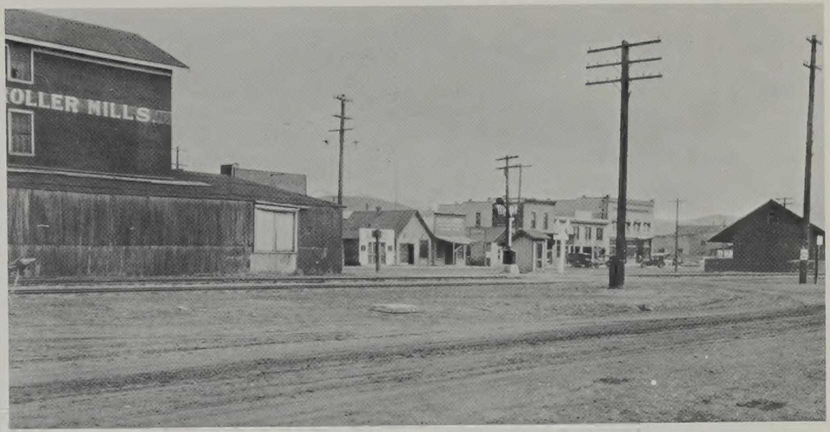
Street view, Elko, 1927, looking westerly. The westernmost of the railroad freight houses appears at the right. The S.P. passenger station, at Fourth and Railroad Streets, in the left center background, and the Verdi Lumber Company warehouse is in the extreme left background.



Looking east along Railroad Street at Fourth Street, 1927. Note the long-gone water tank, a short distance east of the Overland Hotel; both are visible in the right background.



Elko Flour Mill, 1927, Commercial Street, near Eighth Street (Elko Roller Mills).



A 1927 view showing the Elko Roller Mills building. The Hesson Hardware Building and the easternmost of the three big S.P. (C. P.) warehouses at Elko (at Seventh Street) are seen in the right background

AUTHOR'S ADDENDUM
(Telephone conversation, October 18, 1974)

1. The wooden warehouse south of the Silver Dollar Saloon in the block bounded by Fourth, Fifth, Commercial and Silver Streets and currently used as a warehouse by Bodily Furniture appears to be the first of three original freighthouses erected by the Central Pacific Railroad along their trackage in the 1860s. An open platform dock was constructed on the east side of the first warehouse to accommodate expanded freight business prior to the construction of the second and third warehouses.

   Source: Roy Mills, retired Southern Pacific freight and passenger agent, and Charles Paul, long-time Elko resident, drawing on knowledge of his father.

2. The second storey of the Western Pacific passenger depot at Third and Silver has been razed.

Appendix 6

Archeologic Report

Mary Rusco,
Nevada Archeologic Society, University of Nevada, Reno

REPORT OF ARCHAEOLOGICAL RECONNAISSANCE FOR THE ELKO, NEVADA RAILROAD RELOCATION DEMONSTRATION PROJECT -AND-

STATEMENT OF ENVIRONMENTAL IMPACT OF THE RELOCATION PROJECT ON ARCHAEOLOGICAL RESOURCES WITH RECOMMENDATIONS

by Mary Rusco, Consulting Archaeologist
Nevada Archeological Survey
University of Nevada, Reno

Project: An intensive archaeological reconnaissance was conducted by the author and 4 field assistants along the proposed locations for 8 alternative railroad relocations and/or separation plans in order to inventory archaeological resources, assess their significance and predict direct and indirect impact on these resources by the proposed project.

Area: The alternative plans are all located along a corridor varying in width from 0.5 to 2.0 miles through the city of Elko.

The archaeological significance of this location derives from its proximity to the braided channels of the Humboldt River just upstream from the confluence of the South Fork with the main channel. This westward flowing river has probably served as a major transportation route across the northern Great Basin from earliest human penetration into the area just as it did for the Anglo-American emigrants in the mid 19th Century, and as it continues to do so today. For many of the Numic speaking Indians who had been occupying the Great Basin for centuries before white contact, this river was reported to be the site of winter encampments where a relatively dense population was supported by the fish and other resources it provided (c.f. Steward, 1938: 152-3). Radiocarbon dates from deposits in the South Fork Shelters document an apparently intermittent occupation of those sites from 2410 to 1370 B.C. and projectile point types from upper levels suggest occupation subsequent to A.D. 1200 (Heizer, Baumhoff and Clewlow, 1968; Hester, 1973: 42-46, 110-1, 128). According to Steward's informants the mouth of the South Fork was a preferred site for a winter encampment. It was known to the Numic people as Punodüngahnivain (place where the house is), but small encampments could be found every mile or so along the river between Battle Mountain and Deeth (Steward, 1938: 152-153). Recent archaeological reconnaissance along the proposed right-of-way of the Elko Bypass for Interstate 80 resulted in the recording and investigation of the site of an hypothesized winter encampment on terraces of the Hunboldt River just downstream from the area of the railroad relocation project (Rusco, n.d.)

During the summer of 1958, Heizer and Baumhoff recorded a series of sites along the South Fork including ones at its confluence with the main channel. Intensive investigation was largely limited to the shelters (Heizer, Baumhoff and Clewlow, 1968) and to date the Interstate 80 highway salvage project is the only systematic recovery of data from an extensive open site along the river above Carlin.

The Humboldt River around Elko has been the scene of human activity for at least 4500 years and probably much longer. At the time of Anglo-American entry, the area supported a population more dense than most of the Great Basin. Human activity became progressively more intense in the 1870's following mining booms in the White Pine mining district in the south and Elko served as a major communication-transportation center serving mining districts to the south and north as far as Idaho. (Patterson, Ulph and Goodwin 1969; HRB No. 12). The flood plain and terraces of this river bear the scars of over a century of mechanized transportation, farming and urban construction. The traces of earlier occupation which can be expected to have survived are rare and accordingly the more valuable as a source of knowledge about the area's prehistoric and early historic heritage.

Method: A team of 2 field assistants under the supervision of the project director drove along all of the proposed alternate project locations in order to identify areas where the earth surface had been subject to the least post 1900 modification by excavation, construction or land fill activities. Intensive on foot reconnaissance was limited to those areas (Map 1).

The reconnaissance team walked from 2 to 4 transects of each of these areas, looking for surface indications of prehistoric and early (pre-1900) historic remains. Excavation, road and stream cut profiles were inspected for indications of subsurface remains. An area identified by the project's historical consultant as the site of a pre-1900 toll station/ (Goodwin, personal communication), (c.f. Patterson, Ulph and Goodwin 1969: 548-9) was carefully inspected (Map 2). Silver Street, also identified as the site of significant early historic activity was inspected both on foot and from car (Patterson, Ulph, and Goodwin 1969: 545-7).

Two sites of prehistoric activity were found during the reconnaissance. A preliminary site examination was conducted at each of these sites. Observations were recorded on standard site inventory forms of the Nevada State Museum archives and were assigned permanent site numbers. Test pits .5 x 1.0 m were excavated to a depth of 60 cm at each site. Pits were excavated by arbitrary 10 cm levels below the loose surface soil horizon which in each pit was ca. 5 cm deep. Fill was screened through 1/8" mesh rocker screens. When flakes were found below the surface horizon in the test pit at site EK 182, trowels and brushes were used for part of the excavation.

Specimens found in the test excavations were catalogued and are stored in the permanent collections of the Nevada Archaeology Survey. No surface collections were made at the sites. Basic ecological data including soil profiles were recorded for the permanent archives.

SITE INVENTORY

Historic: Two areas were identified as historic sites by the project historian. These were inspected specifically to seek archaeological remains of historical significance.

Toll Station: This site, located on the right bank of the river at 9th Street, has apparently been subject to a great deal of relatively recent modification. Remains of a 20th Century structure were found, some debris of an earlier date were noted but no remains which could be assigned to the station. It would appear that most if not all traces of the historic structure had already been obliterated if the site has been correctly identified.

Silver Street: Post-1900 construction including paving have obscured most traces of the early occupation of Silver Street. No subsurface tests were made in this area which is now intensively occupied. Excavations would more than likely expose historic midden and structures.

Prehistoric: Two sites were recorded: 26 EK 182 located between existing tracks of the Southern Pacific and Western Pacific railroads on the East edge of the city, and 26 EK 183 located on bluffs overlooking the Humboldt along the proposed 12th Street extension (Map 2).

EK 182: This site is associated with an old flood plain of the river. Archaeological manifestations on the surface are concentrations of flake stone artifacts. At least 3 concentrations are roughly circular areas approximately 3 - 4 m in diameter. The test pit was excavated near one of these concentrations in an area where the back dirt from large animal burrows was observed to contain flakes.

Artifacts observed on the surface were predominately debitage from the manufacture of flake tools made from a white cryptocrystalline sillicate known to be quarried north of Battle Mountain. Fragments of various artifacts, probably cutting or scraping tools, were observed. No projectile points or other types of artifacts which can be clearly assigned a relative date were observed.

During the test excavation a total of 20 flakes, 8 charred bone fragments (unidentified, but probably from small rodent species) small pieces of charcoal and burned earth were recovered at various depths down to 45 cm.

EK 183: This site is located on a bluff above the left bank of the river, probably an old dissected terrace. Artifacts observed were similar to those at EK 182. No concentrations were noted and the test excavation revealed no archaeological remains below the loose surface horizon.

Because of the absence of temporally diagnostic artifacts particularly projectile points, it is impossible to estimate time depth for either site. It is likely that a complete systematic collection from the surface plus excavation of a significant portion of EK 182 would yield the necessary data, to place these sites in time.

On the basis of the preliminary site examination it can be inferred that both sites were the locus of a variety of activites including the manufacture and/or retouching of flake tools, and the processing of various raw materials, including food, by scraping and cutting. The examination of surface collections made from these sites by residents of Elko might well yield additional data.

RECOMMENDATIONS: The 9th Street location of the toll station is not judged to have significant archaeological remains on the basis of the preliminary site examination. Construction in that area should proceed with due caution.

The Silver Street alternative crosses an area of historic significance. No subsurface test excavations were made in this now congested area. Such tests would be extremely expensive and are not judged to be necessary unless that alternative is selected for construction. Construction should be preceded by a systematic search for significant historic remains.

Sites EK 182 and EK 183 should be avoided if possible. Salvage of archaeological remains could be accomplished by a complete systematic surface collection, excavation of a 20% sample of EK 182 and additional subsurface testing of EK 183. Approximately 10 person/days would be required to surface collection and mapping, for each site. Excavation of a sample of the part of EK 182 which would be subject to adverse impact would require approximately 1 person/day per sq. m. Laboratory analysis requires approximately the same time as field work.

SUMMARY: Two areas of historic significance were examined. Caution should be exercised if the 9th Street location is chosen for construction. Silver Street should be avoided or provision made for intensive subsurface testing and salvage.

Site EK 182 should be avoided or provision made for extensive salvage. The extension of 12th Street to the Lamoille Highway crosses EK 183 and construction should not proceed without systematic collection from surface and some additional subsurface testing.

All other alternatives can be considered to pose little if any threat of adverse impacts on significant archaeological values.

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Appendix 7

River Crossing Origin - Destination Survey Procedures

A survey was conducted April, 1974 on northbound traffic at the Fifth and Ninth Street bridges between 6 AM and 6 PM (weekday). A total of 3,822 vehicles (2,519 on Fifth and 1,303 on 9th) were counted, of which 80 percent were sampled. The sampled data was expanded to account for all, two-way traffic on the bridges over a 24-hour period, or 10,323 trips in all. This expanded count is consistent with Nevada State Highway 1973 traffic counts.

Forecast traffic volumes were determined by assuming a total population of 17,933 by the year 2003 and by assuming that 51 percent of the population would be located on the south side. The south side population was subsequently apportioned to each of the five traffic zones in the south side of the city according to their growth potential as indicated by present building trends, zoning regulations, availability of buildable land, and availability of sewer and water services.

With a household rate of 2.8 persons per household and a household trip generation rate of 9 trips per household, trip end estimates for each traffic zone were derived as follows:

$$\text{number of bridge trips produced in zone} = \frac{\text{zonal population}}{2.8} \times 9$$

A lower trip rate of 4.5 per household was assumed for the zone encompassing the spring creek area to take into account the greater travel distances involved.

The resultant trip ends that were projected for each of the zones in the south side are shown on Table A7-1 along with present trip ends.

Table A7-1

EXISTING AND PROJECTED TRIPS CROSSING RIVER

Trip Ends by Production Zone	1974[1]	Percentage of 1974-2003 Residential Growth South of River Allocated to Each Zone[2]	Trip Ends Increase from Growth Allocation[3]	2003	Average Annual Percentage Increase in Trip Ends
1	1186	30	7138	8244	24.0
2	1125	15	4230	5355	13.0
3	3858	10	1488	5346	1.3
4	2225	30	5290	7515	11.6
5	1929	15	3237	5166	9.2

---

[1] Origin-destination survey by Chilton Engineering staff, April 1974.

[2] 1974-2003 population increase of 6687 south of the river (see land use projections in Section 22) allocated to the five zones based on availability of sewer and water services, buildable land and recent growth trends.

[3] Population divided by 2.8 persons per dwelling unit and multiplied by 9 trips per household.

Appendix 8

Derivation of Highway Delay Benefits

The degree of disruption to traffic flows at the seventeen grade crossings along the Southern Pacific (SP) and Western Pacific (WP) tracks is a function of: 1) North-south traffic volumes at Railroad, Commercial and Silver Streets, and 2) train volumes and average duration of train blockage. The methodology for deriving future delay therefore required projections on these traffic and train volumes, based on past trends, delay surveys and traffic count data and assumptions of future growth.

Data describing vehicle activity on Fifth Street at Railroad/Commercial were selected as the baseline from which total volumes crossing the SP and WP tracks were determined; this was the only intersection for which past, complete information on delay (1963, 1972) was available. Based on vehicle turning movement data collected for this study, cross SP track traffic on Fifth was found to account for approximately one-third of total cross-SP track traffic. Table A8-1 shows the traffic patterns across the SP track for one hour of day -- 11:45 AM to 12:45 PM -- which is assumed to be representative of north-south travel patterns throughout the day.

Table A8-1

CROSS SOUTHERN PACIFIC TRAVEL PATTERNS

Street	Ratio of Given Street Volume to Fifth Street Volume*
Second	negligible
Third	.61
Fourth	.36
Fifth	1.00
Sixth	.33
Ninth	.41
Eleventh	.26
Fourteenth	negligible
TOTAL	2.97

Assuming that these present travel patterns would continue throughout the analysis period (1978 to 2003), total cross-SP track volumes were predicted by projecting Fifth Street volumes and then applying the factor, 3.0, to obtain total crossing volumes.

A four percent average annual growth rate for cross WP and cross SP track traffic in the period, 1978-2003, was derived on the basis of past trends and a projected population growth rate of three percent.

Traffic on Fifth at Silver was found to be somewhat higher than Fifth at Railroad/Commercial due to the fact that residents on the south side had to cross the WP tracks for practically all work, shop and personal business trips. Based on state highway traffic count data, a factor of 2.36 was derived to obtain total cross-WP track traffic based on Fifth Street volumes on Silver Street for a given period of time. The same growth factor (based on the increased population growth rate) was placed on cross-WP track traffic as for the SP track to obtain yearly projected increases in volumes.

Once the yearly volumes were determined, the following formula was utilized to compute the percent of vehicles that would actually be delayed by train passage through the City. This formula is based on delay survey data taken in the years 1963, 1972 and 1974 during which train tonnage increased at an average annual rate of two percent. It was assumed that this growth pattern would continue for at least the next 30 years and was implicit in the calibration of the formula.

$$\text{Percent vehicles delayed} = (.002 + .005\,V) \quad \times 100$$

V = volume on Fifth Street at Railroad/Commercial (thousands)

The percent delayed, based on Fifth Street data, was assumed to be the same for all of the crossings.

The product of total vehicle volumes and percent delayed/100 yielded the total number of vehicles delayed at all crossings. Assuming an average delay per vehicle of 2.2 minutes (based on delay survey data), the total average daily wait time expended at the crossings was determined and converted to annual number of hours of wait time.

Finally, a value of $3.45 per hour, representing delay and time delay costs[1] was applied to the above wait times to obtain the dollar value of delay due to train traffic.

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[1] Federal Railroad Administration, Report to Congress, Railroad - Highway Safety Part II: Recommendations for Resolving the Problem, August 1972, P. 77

Appendix 9

Relocation Assistance

Business and Residential

RELOCATION ASSISTANCE FOR HOMEOWNERS AND TENANTS

Those persons who legally occupy any type of residential premises as either owner or regular tenant, and whose premises will be required for the construction of a Federal Aid project, are eligible for relocation assitance services.

Available assistance includes help in finding replacement housing or vacant land, providing current F.H.A., V.A. and conventional home financing information and information on other agencies which provide needed services. The relocation agents will provide information on interest rates, down payments, closing costs, available purchase and rental properties, and other helpful items.

There are two basic moving cost allowance options from which a displaced person or family may select the one which is the most convenient or preferable and for which the person or family is eligible.

1. Any eligible person or family may elect to have a moving company's actual bill reimbursed.
2. Eligible dislocated persons who occupy residential premises or mobile homes may elect to receive a self-move option.

In addition to reimbursement for the actual cost of transporting personal property by a moving company, displaced persons may be eligible also for such related costs as the following:

1. Appliance disconnect and hook-up charges.
2. Utility disconnect and hook-up charges.
3. T.V. Antenna disconnect and hook-up charges.
4. Dismantling charges.
5. Re-assembly charges.
6. Crating and packing charges.
7. Insurance charges for the property moved or stored.
8. Temporary storage charges for the property moved (12 months maximum)
9. Reinstallation service charges.
10. Loading and unloading of the property moved.
11. Cost required to obtain firm moving bids or estimates.
12. Transportation to replacement housing.
13. Actual expenses for un-setting, disconnecting, transporting, resetting and reconnecting mobile homes.
14. Storage bills.

In addition to moving expenses, a person who has legally occupied residential premises as either an owner-occupant or a non-transient tenant for a specified period of time is eligible for a replacement housing payment allowance.

Replacement housing payments are sums of money which must be used as rent supplements, as purchase down payments or to assist in the purchase of adequate or comparable replacement housing.

If a person has owned and occupied a residence for not less that 180 days prior to the initiation of negotiations for the purchase of property, he is eligible, if he purchases a replacement dwelling, for a payment not to exceed $15,000 that is made up of the following elements:

1. A sum if any, which when added to the purchase price of the dwelling equals the reasonable cost of a comparable, safe, decent and sanitary dwelling such sum to be applied only to the purchase of a dwelling.

2. A sum, if any, that will compensate for an increased interest cost in the purchase of replacement dwelling if the mortgage or trust deed was in effect for not less than 180 days prior to the initiation of negotiations for the purchase of the dwelling.

3. Reasonable and necessary closing costs in the purchase of a replacement dwelling.

If a person has owned and occupied a residence for not less than 90 days nor more that 179 days prior to the initiation of negotiations for the purchase of the property, he is eligible, if he purchases a replacement dwelling, for a payment not to exceed $4000 that is made up of the following elements:

1. A sum, if any, that is the amount necessary to make a down payment, but not to exceed $4000, except that if such amount exceeds $2000 he must equally match any such amount in excess of $2000.

2. The costs shown in 3 above.

If a person has owned and occupied a residence for not less that 180 days prior to the initiation of negotiations for the purchase of the property, he is eligible, if he rents a replacement dwelling, for a payment not to exceed $4000 that is a sum that is the amount necessary to rent a comparable replacement dwelling for four years and subtracting from this amount, 48 times the economic rent for his residence.

If a person has rented or leased a residence for not less than 90 days prior to the initiation of negotiations with his landlord for the purchase of the property, he is eligible, if he purchases a replacement dwelling, for a payment that is made up of the following elements:

1. A sum, if any, that is the amount necessary to make a down payment, but not to exceed $4000, except that if such amount exceeds $2000, he must equally match any such amount in excess of $2000.

2. The costs shown in 3 above.

If a person has rented or leased a residence for not less than 90 days prior to the initiation of negotiations with his landlord for the purchase of the property, he is eligible, if he rents a replacement dwelling for a payment that is as follows:

A sum, if any, that is the amount necessary to rent a comparable replacement dwelling for four years and subtracting from this amount 48 times the average month's rent paid by him in the three months immediately preceding the initiation of negotiations.

Other costs incidental to the purchase of a replacement dwelling that are reimbursable include:

1. Title Search
2. Conveyance contract preparation
3. Surveys
4. Notary fees
5. Plat drawing preparation
6. Recording charges
7. Appraisal fees charged by FHA, VA or lender
8. FHA application fee
9. Structural soundness certification by FHA, VA or lender
10. Credit reports
11. Title abstractions or policies
12. Escrow agents fees
13. Nevada real property transfer tax

Replacement housing payment limitations of considerable importance are as follows:

1. Rental replacement housing allowances in excess of $2000 will be disbursed in four equal annual payments, provided that the person remain in safe, decent and sanitary housing.

2. Down payment replacement housing allowances must be applied to the purchase price and are limited to the actual down payment amount and related closing costs. This is a very strict limitation for Federal-aided housing programs such as HUD 235i.

3. If a displaced owner-occupant on his own voluntarily purchases and occupies a safe, decent and sanitary replacement dwelling at a price that is less than the acquisition price of his former dwelling, no replacement housing allowance is due and payable.

4. If a displaced owner-occupant on his own voluntarily purchases and occupies a safe, decent and sanitary replacement dwelling at a price that is less than the acquisition price of his former dwelling plus the calculated replacement housing allowance, the actual payment will be limited to the difference, if any, between the acquisition price of the former dwelling and the actual purchase price of the replacement dwelling.

BUSINESS RELOCATION ASSISTANCE

Relocation assistance is available to owners or non-transient tenants who legally occupy business premises and move as a result of the acquisition by purchase or condemnation of a property that is acquired on a Federal-Aid project.

There are three basic moving cost allowance options from which a displaced person or enterprise may select one which is the most convenient or preferable and for which the person or enterprise is eligible.

1. Any eligible person, or enterprise may elect to have a moving company's actual bill reimbursed.

2. Businesses or agricultural enterprises may elect to receive a self-move option payment. It is an amount equal to the lower of two bids obtained from qualified movers by the Highway Department.

3. Businesses or agricultural enterprises that are disrupted may if they are eligible, elect to receive an allowance that is equal to the average annual net earnings, up to a maximum of $10,000.00.

4. Businesses or agricultural enterprises may be reimbursed for their actual reasonable expenses incurred in searching for a replacement business or farm.

5. Actual direct losses of tangible personal property resulting from the move or discontinuance, but not to exceed an amount equal to the reasonable expenses that would have been required to relocated such property.

In the case of a discontinued operation, a disrupted business may be eligible for a payment equal to the average annual net earnings or a sum that is not less than $2,500 nor more than $10,000, the business must meet the following requirements:

1. The business enterprise must be a factual one and which contributes materially to the income of the displaced owner or operator.

2. The displaced owner or company must demonstrate that the business cannot be relocated without a substantial loss of existing patronage, or that it will be discontinued.

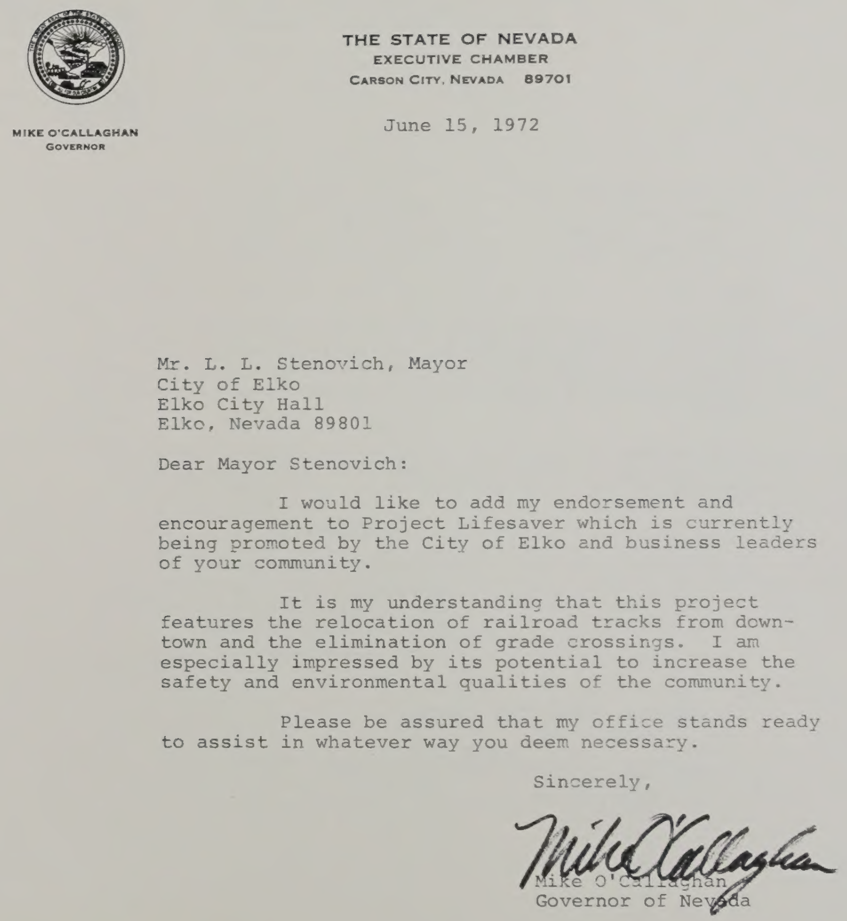
3. The business is not part of a commercial enterprise having at least one other establishment which is not being acquired by the State of Nevada or by the United States and which is engaged in the same or similar business.

4. The displaced owner or company must furnish acceptable financial records for two taxable years preceding his dislocation in order to establish the amount of the allowance.

In addition to the above, displaced businesses are provided with assistance on financing, interest rates, closing costs, reimbursement for certain storage costs, moving expenses, disconnect and hook-up charges, moving bids, insurance charges for property moved or stored and relocation of advertising.

Appendix 10

Letters of Comment



MIKE O'CALLAGHAN
GOVERNOR

THE STATE OF NEVADA
EXECUTIVE CHAMBER
CARSON CITY, NEVADA 89701

June 15, 1972

Mr. L. L. Stenovich, Mayor
City of Elko
Elko City Hall
Elko, Nevada 89801

Dear Mayor Stenovich:

I would like to add my endorsement and encouragement to Project Lifesaver which is currently being promoted by the City of Elko and business leaders of your community.

It is my understanding that this project features the relocation of railroad tracks from downtown and the elimination of grade crossings. I am especially impressed by its potential to increase the safety and environmental qualities of the community.

Please be assured that my office stands ready to assist in whatever way you deem necessary.

Sincerely,

Mike O'Callaghan

Mike O'Callaghan
Governor of Nevada

March 3, 1849

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
Division of River Basin Studies
Box 06 Federal Bldg.--U.S. Courthouse
550 West Fort Street
Boise, Idaho 83724

November 13, 1974

Mr. Ira S. Rackley, P.E.
Project Manager
Chilton Engineering
Elko, Nevada 89801

Dear Sir:

In accordance with your request of October 29, 1974, concerning the Elko Railroad Relocation Project, we have reviewed the project description. Based upon the information presented, it appears that the synopsis adequately covers matters of jurisdictional concern to the USFWS.

We appreciate the opportunity to review your proposal. Please advise of any changes in project plans, and we in turn will re-evaluate accordingly.

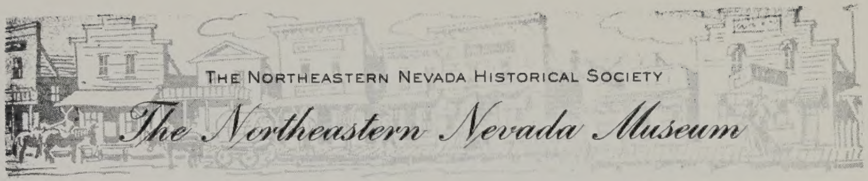
Sincerely,

Richard J. Fisher

Richard J. Fisher
Field Supervisor

cc:
Director, Nevada Fish & Game
Reno, Nevada

Mr. Glenn Koskins, Nevada Fish & Game
Elko, Nevada



THE NORTHEASTERN NEVADA HISTORICAL SOCIETY
The Northeastern Nevada Museum

POST OFFICE BOX 503 · TELEPHONE 738-3418 · ELKO, NEVADA 89801

HOWARD HICKSON
MUSEUM DIRECTOR

October 23, 1974

Mr. Ira Rackley
Chilton Engineering
421 Court Street
Elko, Nevada 89801

Dear Ira:

Concerning our telephone conversation the afternoon of October 23, 1974, I have examined the National Register of Historic Places (Volume 39, Number 34: Tuesday, February 19, 1974) and determined there are no sites listed in Elko County.

However, as an historian and a national advisor of the National Trust for Historic Preservation, I strongly urge that care and consideration be given the following sites: (1) Elko County Courthouse, Idaho and Sixth Streets. (2) Old County Library building on Court Street which was the first county high school opened in Nevada. (3) Two original Central Pacific warehouses: one between Fourth and Fifth Streets now being used by Bodily Furniture and the structure a half block east of Eleventh Street. (4) Site of Fort Halleck. (5) The communities of Tuscarora and Jarbidge.

Sincerely,

Howard

Howard Hickson
Museum Director

HH/tjr

A FACILITY OF ELKO COUNTY

November 6, 1974

Mr. Eric Cronkite, Director
Nevada Division of Parks
201 South Fall Street
Carson City, Nevada

Dear Eric:

We have just reviewed the historic materials supporting an Environmental Impact Statement to be prepared by the City of Elko pertaining to relocation of the Southern and Western Pacific tracks through the community.

The work done by the various persons represented is totally adequate to justify the proposed Draft Environmental Impact Statement.

The complete package is a "text book" example of cooperation between specialists in history and anthropology in support of public projects.

Sincerely,

John M. Townley
Director

MIKE O'CALLAGHAN
Governor

NEVADA

NEVADA
STATE
PARK
SYSTEM

ERIC R. CRONKHITE
Administrator

ROOM 221
NYE BUILDING
201 S. FALL STREET
CARSON CITY
NEVADA 89701
702/882-7339

November 22, 1974

Mr. Ira S. Rackley, P.E.
Project Manager
Chilton Engineering
CDXXI Court
Elko, Nevada 89801

Dear Mr. Rackley:

As State Historic Preservation Officer, I have reviewed your historical and archaeological reports and comments by the State Museum Archaeologist and the Nevada Historical Society. These should be incorporated in your Environmental Impact Statement on the Elko railroad relocation project.

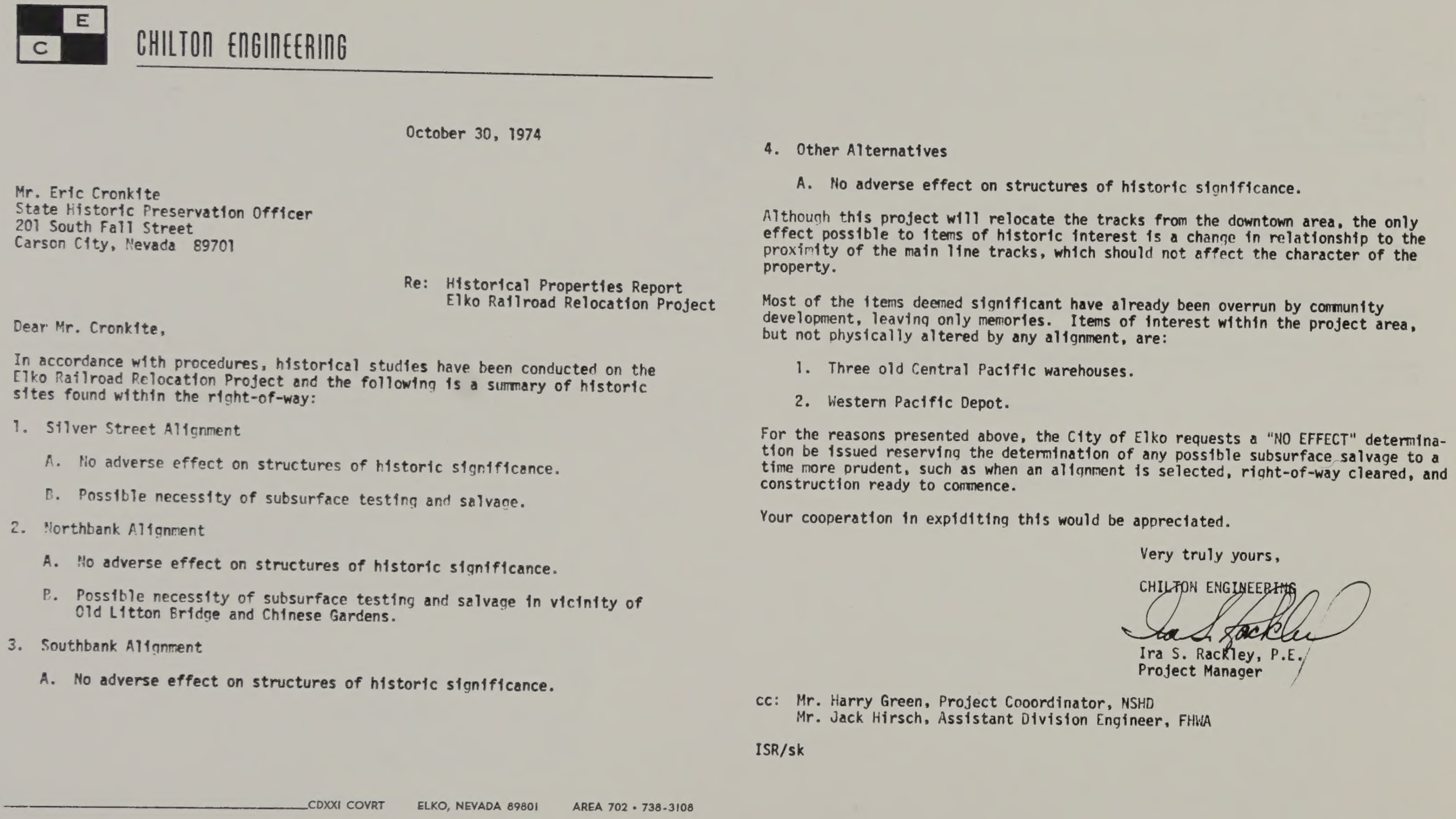
It does not appear that these sites are of sufficient magnitude to include or be eligible for inclusion in the National Register of Historic Places. After the right-of-way alignment has been selected, consideration should be given to appropriately marking historic sites. If it is determined that sites of archaeological value will be disturbed, the State Museum or another professional archaeologist should be employed to take appropriate action.

Sincerely,

Eric Cronkhite

Eric R. Cronkhite
State Historic Preservation Officer

a division of the Department of Conservation and Natural Resources
Elmo J. DeRicco, Director



C E
CHILTON ENGINEERING

October 30, 1974

Mr. Eric Cronkite
State Historic Preservation Officer
201 South Fall Street
Carson City, Nevada 89701

Re: Historical Properties Report
Elko Railroad Relocation Project

Dear Mr. Cronkite,

In accordance with procedures, historical studies have been conducted on the Elko Railroad Relocation Project and the following is a summary of historic sites found within the right-of-way:

1. Silver Street Alignment
    A. No adverse effect on structures of historic significance.
    B. Possible necessity of subsurface testing and salvage.
2. Northbank Alignment
    A. No adverse effect on structures of historic significance.
    B. Possible necessity of subsurface testing and salvage in vicinity of Old Litton Bridge and Chinese Gardens.
3. Southbank Alignment
    A. No adverse effect on structures of historic significance.
4. Other Alternatives
    A. No adverse effect on structures of historic significance.

Although this project will relocate the tracks from the downtown area, the only effect possible to items of historic interest is a change in relationship to the proximity of the main line tracks, which should not affect the character of the property.

Most of the items deemed significant have already been overrun by community development, leaving only memories. Items of interest within the project area, but not physically altered by any alignment, are:

1. Three old Central Pacific warehouses.
2. Western Pacific Depot.

For the reasons presented above, the City of Elko requests a "NO EFFECT" determination be issued reserving the determination of any possible subsurface salvage to a time more prudent, such as when an alignment is selected, right-of-way cleared, and construction ready to commence.

Your cooperation in expiditing this would be appreciated.

Very truly yours,

CHILTON ENGINEERING

Ira S. Rackley

Ira S. Rackley, P.E.
Project Manager

cc: Mr. Harry Green, Project Cooordinator, NSHD
Mr. Jack Hirsch, Assistant Division Engineer, FHWA

ISR/sk

CDXXI COVRT ELKO, NEVADA 89801 AREA 702 • 738-3108

STATE OF NEVADA

DEPARTMENT OF FISH AND GAME

1100 VALLEY ROAD, RENO, NEVADA • TELEPHONE 784-6214

MAIL: P.O. BOX 10678, RENO, NEVADA 89510

MIKE O'CALLAGHAN
GOVERNOR

GLEN K. GRIFFITH
DIRECTOR

IN REPLY REFER TO: Patrick Coffin
Regional Ass't.-Fisheries
1375 Mtn. City Hwy.
Elko, Nevada 89801

August 27, 1974

Mr. Ira Rackley
Chilton Engineering
421 Court Street
Elko, Nevada 89801

Dear Ira:

I reviewed the reports relating to the Elko railroad relocation project and would like to make the following comments:

1. a.) "Description of Proposed Action."--no comment
   b.) "Description of Existing Environment."--Segment under Wildlife might read "preclude any abundance of these animals" since a few are resident in the west end of the project. Also bullfrogs might be added to the list of amphibians in the vicinity of the project.
   c.) "Environmental Impact of the Proposed Action."--Should read Nevada Department of Fish and Game.
   d.) "Unavoidable Adverse Environmental Effects."--Excavation activities usually have relatively long term effects on fish population levels.

2. "Vegetation Study."--no comment
   "Westerly Relocation Extension."--We would recommend maintaining a minimum flow into the original channel. The reduction in river channel from 5,700 feet to 2,600 feet could cause some velocity problems detrimental to both the new channel and some distance downstream. Every effort should be made to prevent extensive erosion problems.

3. "A Limnological Survey of the Humboldt River, Elko, Nevada" June 1974, and August 1974 by David N. Emerson.--Both reports are very well prepared and reveal some interesting data relating to the biological characteristics of the Humboldt River. Of particular interest were the results of the August study showing the influence of the Elko Sewage Treatment Plant and its effects on aquatic life forms.

Thank you for the opportunity to review this data.

Sincerely,

Pat

Patrick Coffin
Regional Assistant-Fisheries
Region II

PC/jt

Elko County School District
Central Administrative Office
TELEPHONE 738-5196
P. O. BOX 1012
Elko, Nevada 89801

June 6, 1974

TO: Mr. Dennis Hugh
Chilton Engineering Co.

FROM: Robert J. Zander, Superintendent

SUBJ: QUESTIONS POSED REGARDING RAILROAD TRACK MOVEMENT AND IT'S EFFECT ON THE SCHOOL DISTRICT

Question 1: Enclosed is an enrollment projection compiled in September, 1973. All figures above the double line are actual enrollment. Those below indicate projected enrollment. This can be used for enrollments in grades 7-12 at the Elko Jr. Sr. High School. To determine the number of students in any one grade from the target area use 40% of the enrollment figure.

Also enclosed is a projection of the students at the Southside School. The 1973 figures represent the actual enrollment as of January, 1974.

Question 2: Future enrollment trends for the district will show a slight increase in the next 7 years. A similar increase can be anticipated for student enrollment at the Southside School in Grades K-6.

Question 3: The boundaries of the elementary district service area within the study area is Railroad Street running east and west. Students living on the south side of Railroad Street and south of that point attend the Southside School. Students living on the north side of Railroad Street attend the No. 2 school.

Question 4: There is no question that the tracks do create a certain inflexibility in school service areas; however, the changes that are being proposed regarding the tracks in the area would not likely change any of the boundaries as they now stand.

Question 5: In the effected areas, there are approximately 50-60 students that must cross one set of tracks daily to attend the Southside School. In addition, there are approximately 500 students attending the Jr. Sr. High School that must cross the tracks in order to get to school.

Question 6: In regard to Question No. 6, to my way of thinking, the important thing is not the number of busses crossing the track to serve the area, but the number of times busses must cross the tracks during the course of a normal school day:

Bus Routes	Times Crossed		Daily Total
5 Regular	4		20
1 Kdg.-Band	2		2
2 Lunch	6		12
		Total	34

Question 7: The route followed by these busses is from the north, Ninth Street across the tracks to River Street; west on River Street to Fifth Street; south on Fifth Street to Front or Wilson Street to reach the Southside School. The return trip is made in reverse. If the project provided an overpass at Fifth and Ninth Streets, or an overpass further east of Ninth Street, this would eliminate the use of Fifth Street for any bus activity.

Question 8: Children living between the tracks at the present time now attend the Southside School and the Jr. Sr. High School. We estimate that there are approximately 75-100 students living in this area at the present time.

Question 9: We would estimate that 25% of the Jr. Sr. High School students drive to school.

Question 10: To my knowledge, there have been no accidents involving children and trains; however, the danger is ever present, since youngsters have been seen crawling under or between the cars of a stopped freight at various times when several crossings have been blocked.

Question 11: The Southside Park does not have any significance for the Southside Elementary School, since most of the students in that area live in the Panorama Trailer Court and utilize the lawns at the school, rather than walk the extra two blocks to the park.

Question 12: There are no parochial schools in Elko.

Question 13: The School District believes that track consolidation and construction of overpasses will benefit the District in the following manner: (1) a more positive safety factor as far as students walking to and from school. (2) No delays in the daily regular and lunch bus schedules that we frequently experience at the present time.

Question 14: The School District would strongly recommend that the south bank alignment, as provided by Mr. Hugh, not be given serious consideration. With adequate overpasses, the south bank alignment would preclude southside residents from using Front Street as an access to Fifth and Ninth and they would find it necessary to come to Wilson Street and this could greatly increase the amount of traffic at the school. If the Eight Street crossing is planned, we would much prefer the north bank alignment; however, it does seem to us it would be much more practical to have the second overpass east of Ninth Street.

Enclosed you will find the comments of the Southside Principal regarding Question No. 14.

bc

Southside Elementary School
501 Lamoille Road
Elko, Nevada

June 6, 1974

Ira S. Rackley, P. E.
Chilton Engineering
Elko, Nevada

Dear Mr. Rackley:

You requested a response from the school district on several aspects concerning the railroad track relocation. The two primary proposals that pertain to the Southside School are those of the south bank alignment and the extension of Lyon Avenue. I will attempt here to give you my reaction to these two proposals.

South bank alignment: It is my opinion, as Principal of the Southside School, that the north bank alignment would be more beneficial to this school than the south bank alignment. There are three primary objections that I have to the south bank alignment. First, it would relocate the railroad tracks closer to the Southside School. This, in my opinion, would be a definite disadvantage because of a closer proximity to the school and additional noise. Second, with the south bank alignment, the overpass necessary to span the tracks and the river would have its starting point much closer to the school. Third, I do not feel it is in the best interest of the Southside community to locate the tracks on this side of the river as it has the possibility of splitting the town a little more rather than bringing it closer together.

Extension of Lyon Avenue: I have a mixed reaction to the proposal of extending Lyon Avenue. At the present time all of the playgrounds at the Southside School are not bordered by a through street. If Lyon Avenue were to be extended then both the intermediate and primary playground would be bordered by a through street. Another disadvantage that I can foresee is traffic problems on the one way street and present parking lot for the Southside School. This area is presently utilized for loading and unloading buses and as a parking area for the Southside Staff. If Lyon Avenue were to be extended I can foresee a traffic problem developing as this short street connects 9th street and Lyon Avenue and borders the intermediate playground. The only advantage I can see to extending Lyon Avenue is that it would alleviate some of the traffic that presently utilizes 9th street. The only way I could favor extending Lyon Avenue would be if proper safeguards were taken to insure that there could be no access to the Southside grounds from Lyon Avenue.

In summation it is my opinion, as Principal of the Southside School, that the north bank alignment is more advantageous to the School and that Lyon Avenue should be left as it is.

Sincerely,

Harold Ridgway Jr

Harold Ridgway, Jr.
Principal

HR/bw

CITY OF ELKO FIRE DEPARTMENT

723 RAILROAD STREET, ELKO, NEVADA 89801
BUSINESS 701-738-3211 EMERGENCY 738-7131

September 5,1974

Chilton Engineering
421 Court Street
Elko, Nevada 89801

Attention: Mr. Ira Rackley

Dear Mr. Rackley;

On August 7, 1974 at 0933 hours the Elko Fire Department received an alarm from 156 11th Street of a fire. Upon arrival of the first engine company it was learned that it was a mobile home, fully involved with fire in the rear of the home. The fire was venting thru the window on the street side of the home.

Engine 4, from the South Side Station was responding with Engine 6 from Headquarters Station, on this alarm.

Engine 6 crossed the railroad tracks at the 9th Street crossing just ahead of a west bound freight train. The train was approximately in the vicinity of 11th Street, going west. This was a very dangerour thing to do. But not knowing if the occupants of the house were safe, or if Engine 4 could handle the fire, the firemen decided to gamble on crossing the tracks. Fortunately they did get accross safely.

Upon arrival at the scene, which took Engine 6 one minute to get to the fire, the house was well involved and the occupants just were able to get out.

Due to vacation or sickness, there is times when the South Side Station is unmanned. If this alarm had happened the day before, it could have been a tragic situation. Especially if the train had of been just one minute earlier. We could have had a loss of life, due to not being able to cross the tracks.

For this reason I feel that it is very important that the Project Life Safer be completed as soon as possible.

In a mobile home, fire spreads very rapidly. The ability to get to the scene of a fire in these units,as quickly as possible, can mean the difference of being able to save a persons life or not.

Also to be considered is the South Side School. There is approximately 300 students in this school. It would be a very tragic situation if a train prevented the fire department from being able to ge to the school in an emergency.

Fire in greenhouse, 521 Sage Street, August 20,1974-1835 hours
Weather; wind North West at 5 MPH, temperature 60 degrees.

Engine 6 from the Headquarters Station, to make the initial attack at the back of the greenhouse. Engine 4 from the South Side Station was to make it's attack on the front of the building, due to the spread of the fire.

Engine 4 plus 10 men were delayed 6 minutes by an east bound freight train at 5th and 9th Streets. Having no engine nor sufficient manpower available on the front of the fire, I feel added to the insurance loss on this fire.

Bill Fogle, Chief

FRANCIS D. TAELOUR
Chief of Police
Phone 738-3131

LELAND L. STENOVICH
Mayor

JACK SUTHERLAND
City Manager
Phone 738-5176

CITY OF ELKO
POLICE DEPARTMENT

ELKO, NEVADA 89801

June 10, 1974

Mr. Dennis Hugh
Chilton Engineering
Elko, Nevada

Sir:

In response to your questioneer please find the following information.

Question #1 - A search of our files was conducted and this information supplied to Bill Nisbet of Chilton Engineering. We did not keep a copy of this information and if it can not be located there please inform us and we will do another search of our files.

Question #2 - Delay in response time is a continuous problem due to trains and many times, after the police unit has cleared one set of tracks it is again delayed with a train on the second set of tracks. The calls for police service range from serious situations that require immediate attention to routine complaints. To set down an exact amount of response time lost due to trains on the tracks would be impossible, however, it does occur daily. I can recall twice over the past years where a vehicle was hit on the S.P. tracks, once at 4th. and once at 3rd. where the vehicle was knocked to the south side of the tracks and the police units on patrol were on the north side of the tracks at the time. This required that they had to go west on Highway 40 to the Hot Springs Road to cross and then return to accident scene. This has also happened many other times where it did not involve an accident.

Question #3 - As a general rule there are three police units on patrol and as such have divided the area of patrol so that most of the time one unit would be south of the tracks, one in the downtown area and one north of the tracks, however, there are situations that arise that require all three units at one location which again, leaves the problem of trains on the tracks.

Question #4 - The moving of the tracks would not decrease the present cost of police patrol or response to calls, however, it would greatly increase the efficiency of the patrol as well as make the patrol much more effective in response to emergency situations.

Question #5 - I would assume that the State and Sheriff's police service face the same problems with trains that the City Police do.

In summary, to provide a proper police service to the city the police must be able to respons immediately to all calls for Police service at any given location in the city. Should the tracks be moved and underpasses or overpasses provided it would greatly increase police service as needed, as well as a great safety factor in regards to crossing accidents and saving lives and preventing injuries to the public.

Respectfully submitted,

Francis D. Taelour

Francis D. Taelour
Chief of Police

FDT/vlw

WARREN G. MAGNUSON, WASH., CHAIRMAN
JOHN O. PASTORE, R.I.
VANCE HARTKE, IND.
PHILIP A. HART, MICH.
HOWARD W. CANNON, NEV.
RUSSELL B. LONG, LA.
FRANK E. MOSS, UTAH
ERNEST F. HOLLINGS, S.C.
DANIEL K. INOUYE, HAWAII
WILLIAM B. SPONG, JR., VA.
NORRIS COTTON, N.H.
WINSTON L. PROUTY, VT.
JAMES B. PEARSON, KANS.
ROBERT P. GRIFFIN, MICH.
HOWARD H. BAKER, JR., TENN.
MARLOW W. COOK, KY.
MARK O. HATFIELD, OREG.
TED STEVENS, ALASKA
FREDERICK J. LORDAN, STAFF DIRECTOR

United States Senate
COMMITTEE ON COMMERCE
WASHINGTON, D.C. 20510

June 30, 1972

The Honorable John A. Volpe
Secretary
Department of Transportation
Washington, D. C.

Dear Mr. Secretary:

A very urgent matter in the City of Elko in my State has been brought to the attention of the Federal Railroad Commission, and I have informed Mr. Loftus of the Commission of my views in the matter. A copy of my position is enclosed.

I believe that the proposal by the City of Elko presents a unique opportunity to put into practice some of the beneficial aspects of PL 91-605 as it affects communities which are inhibited in their development by railroad tracks which are routed in a manner to thwart progress.

I hope that your office will be alert to the needs of this community and to the merit of its proposal, which I have asked Mr. Loftus to pursue vigorously.

Your cooperation, as always, is much appreciated.

Sincerely,

HOWARD W. CANNON

HWC:Sco

WARREN G. MAGNUSON, WASH., CHAIRMAN
JOHN O. PASTORE, R.I.
VANCE HARTKE, IND.
PHILIP A. HART, MICH.
HOWARD W. CANNON, NEV.
RUSSELL B. LONG, LA.
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TED STEVENS, ALASKA
FREDERICK J. LORDAN, STAFF DIRECTOR

United States Senate
COMMITTEE ON COMMERCE
WASHINGTON, D.C. 20510

June 30, 1972

Mr. William Loftus
Chairman
Policy Development Division
Federal Railroad Commission
Washington, D. C.

Dear Mr. Loftus:

I understand that you and your associate, Wilbur Canty, visited this week with two valued friends of mine, Mayor L. L. Stenovich of Elko and Mark Chilton, an engineer of the same city.

In my discussions with them, I have been attempting to assist in the impressive initiative they have demonstrated to relocate the railroad trackage through the City of Elko in a manner which will bypass the community and put an end to the crippling physical division which the tracks impose upon the city.

My study of the situation reveals that there is a section of PL 91-605 dealing with problems such as this one, and that perhaps Elko can qualify as a demonstration project under the Act.

I believe that it would be extremely valuable to the Department of Transportation and to our State if you and Mr. Canty could visit Elko for a first-hand look. As you probably already know, the community has organized under "Project Lifesaver, Inc." to remedy an unacceptable situation in their community, and I am sure you will agree with me that they should be given all possible encouragement.

Trusting I will hear from you further on this matter, I am

Sincerely,

HOWARD W. CANNON

cc: Honorable John A. Volpe
Secretary
Department of Transportation

HWC:Sco

Nevada Legislature

CARSON CITY, NEVADA

June 23, 1972

Project Lifesaver
Elko Chamber of Commerce
1601 Idaho Street
Elko, Nevada 89801

Attention: Fred C. Faupel, Manager

Dear Mr. Faupel,

The members of the Project Lifesaver committee and the community of Elko in its entirety are to be congratulated on the development of their report on the need for the relocation of the two main line railroad tracks through downtown.

The costs of the project should be more than offset by the increased convenience, safety and enhancement offered the urban community and the operating railroads.

My sincere best wishes and full support are extended to the committee and to the City of Elko.

Sincerely,

Norman Glaser

Norman D. Glaser
Assemblyman - Elko County

NDG:lb

WARREN G. MAGNUSON, WASH., CHAIRMAN
JOHN O. PASTORE, R.I.
VANCE HARTKE, IND.
PHILIP A. HART, MICH.
HOWARD W. CANNON, NEV.
RUSSELL B. LONG, LA.
FRANK E. MOSS, UTAH
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TED STEVENS, ALASKA
FREDERICK J. LORDAN, STAFF DIRECTOR

United States Senate

COMMITTEE ON COMMERCE
WASHINGTON, D.C. 20510

June 30, 1972

Honorable L. L. Stenovich
Mayor
City of Elko, Nevada

Dear Dutch:

Pursuant to your conversations with my office, I am sending you a copy of the enclosed actions I have taken with the Department of Transportation to insure that Project Lifesaver, Inc., will have full and fair consideration.

Be assured that I will remain alert to any opportunities to assist the community in this worthy enterprise.

It was good seeing you and Mark Chilton, and I do hope I will be able to make the Elko affair again this year so that we can talk further about our mutual interest in this project.

Sincerely,

Howard W Cannon
HOWARD W. CANNON

Enclosures
HWC:Sco

Planning Advisory Commission of the City of Elko
Elko, Nevada

July 5, 1972

Johnnie Aguirre, President
Project Lifesaver
241 Cedar Street
Elko, Nevada

Dear Mr. Aguirre:

At a special meeting held on June 15, 1972, the Elko Planning Commission unanimously voted to go on record as heartily endorsing "Project Lifesaver" in its efforts to relocate the railroad tracks from downtown Elko and the effort made to eliminate traffic hazards elsewhere in the City of Elko.

Sincerely,

John W. King
John King, Chairman

JK/g

NEVADA LEGISLATURE
FIFTY-SIXTH SESSION

WARREN L. MONROE
SENATOR
ELKO COUNTY

MAILING ADDRESS:
P.O. BOX 309
ELKO, NEVADA 89801

COMMITTEES:
CHAIRMAN
JUDICIARY

MEMBER
FEDERAL, STATE, AND LOCAL GOVERNMENTS
TRANSPORTATION

June 20, 1972

Mr. Fred Faupel, Jr.
Project Lifesaver, Inc.
Elko, Nevada

Dear Fred:

I wish at this time to commend you and your organization for your efforts in behalf of removing one of Elko's greatest hazards and one of the worst deterrents to growth of the city's down-town business district, namely; removal or realignment of the railroad tracks which bisect the city from east to west.

I have participated over many years in what now appears to have been an inadequate attempt to bring about the goal which your group has now set for itself and for the community. These past attempts lacked the organization and support which is being given this worthy project today.

It is my fervent prayer that Project Lifesaver will find a real solution to the railroad track problem-- one that removes or materially lessens the railroad location problem and one that is sufficiently practical to warrant the united support of the entire community in carrying it out to final accomplishment.

I have publicly voiced my support of a practical solution to this problem, if one could be found, and I reiterate that promise of support to you now with the hope that such a solution will be found and that in the not too distant future a project will actually be underway.

Please count on me for any contribution within my capabilities.

Sincerely

Warren L. Monroe
Warren L. Monroe

L. L. STENOVICH, Mayor
JOHN M. SUTHERLAND, City Manager
DOROTHY CORTA, City Clerk

JOHN F. SMALES, City Engineer
DENNIS PETERSEN, Building Inspector

CITY OF ELKO
1751 College Avenue
ELKO, NEVADA 89801

October 23, 1974

Ira S. Rackley, P.E.
Project Engineer
421 Court Street
Elko, Nevada 89801

Dear Ira,

As per our phone conversation, the following information is being submitted for stating the City's position on developing and maintaining a soutside city park in event of a Railroad Relocation corridor location being picked which will affect the existing park located between 6th Street and Lamoille Road and along the southbank of the Humboldt River.

The southside park functions as a small neighborhood park for citizens residing in the southern area of Elko. It is the City's position that the relocation of the tracks is of paramount importance to the survival of Elko and the establishment of orderly development. The City and Railroads have worked together towards this end and the City shall stand on the importance of the track relocation to the entire community and the value of the southside park to the residents of that portion of the city.

This particular park has never been dedicated as a City Park but was developed as people began using the open area for recreation. This use through the years lead to establishing the facilities as they now exist. The City automatically assumed maintenance as a public service and the City shall continue to serve in this capacity.

The proposed north and south bank alternative alignments will adversely affect the park as it now functions but the replacement facility along with the track relocation would provide a much greater benefit to the City than leaving the tracks in their present location only to save the present park. After reviewing the data collected, it would appear the only other alternative would be to leave the tracks in the downtown area, consolidated on Silver Street and this would not satisfy the demonstration project congressional directive or the city and railroads desires.

The City of Elko has developed the existing park without Federal Aid and it is the full intention of the City to replace the existing park and maintain a new park with equal or better facilities, if the Railroad Relocation Project location makes this necessary. A probable location, as shown in the project plans for the park and riverfront development, is satisfactory with the City of Elko.

The City, therefore, is very much in favor of doing whatevere is necessary to further this project towards its intended goal.

Very truly yours,

Jack Sutherland

Jack Sutherland
City Manager

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